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"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease." SIR WM. JONES.

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// JOURNAL

OF THE

ASIATIC SOCIETY.



Part II.—PHYSICAL SCIENCE.

No. I.—1872.

Monograph of Indian Cyprinidæ, Part IV,—*by Surgeon* F. Day.

(With Plate I.)

[Received 6th October, 1871.—Continued from p. 367 of vol. XL. Pt. VI, 1871.]

Genus.—Barilius, (*H. B.*) *Bleeker*, (Pl. I.)

Opsarius, sp, McClelland.
Pachystomus, sp. Heckel.
Chedrus, (Swains.) Bleeker.
Opsaridium, Peters, apud Günther.
Pteropsarion sp., *Shacra*, sp. et *Bola* sp., Günther.

Abdomen rounded. Pseudobranchiæ present. Mouth anterior, sometimes oblique, having a moderate or deep cleft. Lower jaw with a knob above the symphysis, and an emargination to receive it in the upper jaw. Suborbital ring of bones generally broad, more especially seen in the third, which may even be entirely behind the vertical from the posterior margin of the orbit. Barbels four (*Pachystomus*, "Heckel," Bleeker), *or two* (*Bendilisis*, Bleeker), *or none* (*Barilius*, Ham. Buch.). *Pharyngeal teeth hooked*, 5, 3 *or* 4, 2 *or* 1 / 1, *or* 2, 4 *or* 3, 5, *or else* 5, 2 *or* 4 / 4 *or* 2, 5. *Dorsal fin without osseous ray, of moderate length, inserted posteriorly to the ventrals, sometimes extending to above the anal, which latter is somewhat elongated. Scales of moderate or small size. Lateral line concave, continued on to the middle or lower half of the caudal, or incomplete, or absent. Gill rakers very short or absent.*

Geographical distribution. Fresh waters of India and Burma, extending to the Malay Archipelago; also found in the Nile and East Africa.

Synopsis of Species.

A. *With four barbels.* (*Pachystomus.*)

1. *Barilius rerio*, D. 2/7, A. 3/12, L. r. 26—28. With blue horizontal bands. *India.*

2. „ *piscatorius*, D. 2/7, A. $\frac{2-3}{11}$, L. l. 42. With 10 vertical bars. *Himalayas* and *Nipál.*

3. „ *radiolatus*, D. 2/8, A. 2/10, L. l. 56. Uniform. *Central India.*

4. „ *modestus*, D. 2/7, A. $\frac{2}{10-11}$, L. l. 43. Back dark, sides silvery. *Panjáb.*

5. „ *Bleekeri*, D. 2/7, A. $\frac{2-3}{10}$, L. l. 43. Seven vertical bars. *Panjáb.*

6. „ *shacra*, D. 217, A. 218, L. l. 53, Twelve vertical bars. *Bengal, N. W. Provinces* and *Asám.*

7. „ *bendelisis*, D. 2/7, A. 3/8, L. l. 43. Short vertical bars. *Southern India.*

8. „ *cocsa*, D. $\frac{2}{7-8}$, A. $\frac{2}{7-8}$, L. l. 42. Vertical bars. *Throughout India.*

B. *With two barbels.* (*Bendilisis.*)

9. „ *vagra*, D. 2/7, A. $\frac{3}{10-11}$, L. l. 42. Indistinct vertical bars. *Bengal* and *N. W. Provinces.*

10. „ *barila*, D. 2/7, A. 3/10, L. l. 43—46. With 14 or 15 vertical bars. *Bengal, Orissa.*

11. „ *nigrofasciatus*, D. 2/7, A. 2/11, L. r. 30. A dark lateral band, *Burma.*

C. *Without barbels.* (*Barilius.*)

12. „ *Bakeri*, D. 3/10, A. $\frac{2-3}{14}$, L. l. 38. A row of large spots. *Travancore.*

13. „ *Canarensis*, D. 2/10, A. 2/13, L. l. 38. Two rows of spots. *Canara.*

14. „ *gatensis*, D. $\frac{2-3}{8}$, A. $\frac{3}{12-13}$, L. l. 40. With 15 vertical bars. *Western Gháts* and *Neilgherries.*

15. „ *tileo*, D. 2/8, A. 2/12, L. l. 70. Two rows of spots. *Bengal* and *Asám.*

16. „ *papillatus*, D. 3/7, A. $\frac{3}{10-11}$, L. l. 39. From 7 to 9 vertical bands, *Orissa.*

17. „ *bola*, D. 3/7, A. 3/10, L. l. 88. Two rows of blotches. *Orissa, Bengal, Asám.*

18. „ *guttatus*, D. 2/7, A. 3/11, L. l. 44. Two rows of spots. *Burma.*

19. „ *interruptus*, D. 2/7, A. 2/12, L. l. 34, incomplete. Short vertical bars. *Hotha.*

20. „ *barna*, D. 2/7, A. 3/10, L. l. 42. Nine vertical bands. *Orissa, Bengal, Asám.*

21. „ *borelio*. D. 2/7, A. $\frac{2}{9-10}$. Silvery. *Bengal* and *N. W. Provinces.*

*22. „ *hoalius*, D. 9, A. 10. Uniform. *N. W. Provinces.*

A. *With four barbels. (Pachystomus.)*

1. Barilius (*Pachystomus*) rerio.

Cyprinus rerio, Ham. Buch., Fish. Ganges, pp. 323, 390; *Cuv. and Val., xvi, p. 406.

Perilampus striatus, McClell., Ind. Cyp., pp. 290, 397, pl. 46, fig. 1, (from H. B. MS.)

Barilius rerio, *Günther, Catal., vii, p. 292.

Danio lineatus, Day, Proc. Zool. Soc., 1868, p. 198, and 1869, p. 378.

Poncha-geraldi. Uriah.

B. III. D. 2/7, P. 13, V. 8, A. 3/12, C. 19, L. l. 26—28, L. tr. 6.

Length of head 1/5, of caudal 1/4, height of body 1/4, of dorsal fin 2/13, of the total length.—*Eyes:* diameter nearly 1/3 of length of head, 1/2 a diameter from end of snout, and 1 diameter apart. Lower jaw the longer; rostal barbels short, maxillary ones reaching the opercle.—*Teeth:* pharyngeal, crooked, pointed, 5, 3, 1/1, 3, 5.—*Fins:* dorsal commences opposite the anal, and slightly before the middle of the total length; dorsal and anal highest anteriorly; caudal deeply forked.—*Lateral line:* absent.—*Colours:* about four metallic blue lines along the sides and forming three bands on the caudal fin. Dorsal with a blue edging. Anal with three longitudinal blue bands.

Hab.—Bengal and Madras, attaining to about 2 inches in length. Hamilton Buchanan and McClelland give 17 rays as existing in the anal fin.

2. Barilius (*Pachystomus*) piscatorius.

Opsarius piscatorius, McClell., Cal. Journ. Nat. Hist. 11, 1842, p. 582.

Barilius alburnus, Günther, Catal., vii, p. 289.

Charl, Panj.

B. III. D. 2/7, P. 16, V. 9, A. $\frac{2-3}{11}$, C. 19, L. l. 42, L. tr. 8/4, Vert. 16/23.

Length of head 1/5, of caudal 1/5, height of body 1/5 of the total length.—*Eyes:* diameter 2/7 of length of head, 1 diameter from end of snout. The posterior extremity of the maxilla extends to beneath the middle of the orbit; lower jaw slightly the longer. Third suborbital bone twice as deep as the uncovered portion of the cheek below it. Humeral process very short. Rostral barbels nearly half as long as the head, maxillary pair very short.—*Teeth:* pharyngeal, crooked, 5, 3, 2/2, 3, 5.—*Fins:* dorsal higher than long, commencing midway between the posterior edge of the orbit and the root of the caudal, its last two rays being over the anal; pectoral not quite so long as the head; caudal deeply forked.—*Colours:* ten dark bands descend from the back to the lateral line; fins yellowish, the edge of the caudal stained greyish.

Hab.—Rivers in the Sub-Himalayas and Ganges, where it attains above five inches in length. Also Nipál and Sikkim. It does not appear im-

probable that specimens "*a—b*, $4\frac{1}{2}$ inches long, from the collection of the East India Company" now in the British Museum, may have been a portion of the ten typical specimens of *O. piscatorius*, McClelland, which were presented by him to the East India Museum, (see McClelland's list in Cal. Journ. of Nat. Hist.,) and now form types of *B. alburnus*, Günther.

3. Barilius *(Pachystomus)* radiolatus.

Barilius radiolatus, Günther, Catal., vii, p. 287.

B. III. D. 2/8, P. 15, V. 9, A. 2/10, C. 19, L. l. 56, L. tr. 5/6.

Length of head 2/9, height of body 2/9 of the total length, excluding the caudal fin. The specimens in the British Museum are in a very bad state, having apparently been dried and subsequently placed in spirit by the Messrs. von Schlagintweit, or else when just caught immersed in alcohol which was too strong, and subsequently shaken about until their tails were destroyed.—*Eyes:* diameter 2/7 of length of head, 1 diameter from end of snout, and rather more apart. The posterior extremity of the maxilla extends to a little behind the front edge of the orbit; lower jaw projects slightly when the mouth is closed. The third suborbital bone nearly reaches the preopercular ridge. Humeral process short. Two pairs of short barbels.—*Fins:* the dorsal higher than long, commencing midway between the eye and the root of the caudal fin, its last ray not extending so far as to arise above the anal. Caudal apparently deeply forked.

Hab.—Central India.

4. Barilius *(Pachystomus)* modestus.

? *Opsarius bicirrhatus*, McClelland, Cal. Journ. Nat. Hist., ii, 1842, p. 582.
? *Barilius bicirrhatus*, *Günther, Catal., vii, p. 290.

B. III. D. 2/7, P. 15, V. 9, A. $\frac{2}{10-11}$, C. 19, L. l. 43, L. tr. $\frac{5\frac{1}{2}}{4\frac{1}{2}}$.

Length of head 2/11, of caudal 2/11, height of body 2/9 of the total length.—*Eyes:* situated in the anterior half of the head, and 3/4 of a diameter from the end of snout. Suborbital ring of bones wide, the third nearly touching the preopercular ridge. Upper jaw slightly the longer; the posterior extremity of the maxilla reaches to below the middle of the orbit. Rostral barbels extend to beneath the front margin of the eye; the maxillary pair minute. Humeral process short. *Fins:* dorsal two-thirds as high as the body below it, commencing midway between the posterior extremity of the caudal lobes and the snout: it is entirely, or all but the last ray, in advance of the anal. Pectoral nearly as long as the head, but not reaching the ventrals, which last extend half way to the base of the anal.—*Lateral line:* very slightly concave.—*Scales* deciduous, two and a half rows between the lateral line and the base of the ventral fin.—*Colours:* back brownish,

strongly defined from the silvery sides; caudal edged with dark; the other fins yellow.

Hab.—The Ravi river at Lahore, where it attains four inches in length and is not uncommon.

This fish differs in coloration from McClelland's, which, he observes, has nine incomplete bars on the sides. The reason of this may be, that his specimens were obtained from the Khyber pass and Kábul river, where coloration is probably more vivid; as, however, the species possesses a pair of minute maxillary barbels, McClelland's name, (provided both are identical), is a misnomer.

5. Barilius *(Pachystomus)* Bleekeri.

B. III. D. 2/7, P. 13, V. 9, A. $\frac{2-3}{10}$, L. l. 43, L. tr. $\frac{7\frac{1}{2}}{5\frac{1}{2}}$.

Length of head 1/5, of caudal, 1/6, height of dorsal 1/7, of body 1/5 of the total length.—*Eyes:* diameter 1/3 of length of head, 3/4 of a diameter from end of snout. Lower jaw slightly the longer, having pores on its lower surface, but none on the snout; the posterior extremity of the maxilla extends to beneath the middle of the orbit. Third suborbital bone not quite half as wide as the uncovered portion of the cheek below it. Humeral process small. Four long barbels, the rostral extending to below the posterior third of the orbit, the maxillary to about the same place. *Fins:* dorsal rather higher than its base is long, but not so high as the body below it, commencing midway between the snout and middle of the length of the caudal fin, its last one or two rays being over the anal; the lower caudal lobe slightly the longer. Pectoral as long as the head without the snout, and extending three-fourths of the distance to the ventral which does not reach the anal.—*Scales:* with several raised lines on each; two and a half rows between the lateral line and base of the ventral fin.—*Colours:* silvery, becoming white beneath, and having a purplish tinge along the back; seven short vertical blue bars along the middle of the side. Fins orange; caudal stained on its outer edge.

Hab.—A river at Gangrete, which joins the Beeas in the Sub-Himalayan range. It is a small species and out of six specimens obtained the largest was only three inches in length, and was said to be adult; it was full of ova.

6. Barilius *(Pachystomus)* shacra.

Cyprinus shacra, Ham. Buch., Fish. Ganges, pp. 271, 385.

Barbus schagra, *Cuv. and Val., xvi, p. 196.

Opsarius cirrhatus, McClell., Indian Cyp., pp. 296, 416, pl. 56, fig. 5, (from H. B. MS.)

Shacra cirrhatus, Günther, Catal. vii, p. 294.

Gürha, Panj.

B. III. D. 2/7, P. 15, V. 8, A. 2/8, C. 19, L. l. 53, L. tr. 11/9.

Length of head, of caudal and of height of body each 2/9, of the dorsal fin 2/13 of the total length.—*Eyes:* diameter 2/7 of length of head, 1 diameter from end of snout. Maxillary barbels as long as the eye, the rostral slightly longer. The maxilla reaches to below the anterior margin of the orbit; third suborbital bone as wide as the uncovered portion of the cheek below it. Humeral process extends to rather behind the origin of the pectoral fin.—*Teeth:* pharyngeal, 5, 4/4, 5, crooked.—*Fins:* dorsal commences midway between the posterior margin of the orbit and the base of the caudal fin, its last ray is over the first of the anal. The four outer pectoral rays strong. Caudal deeply forked.—*Gill rakers* absent.—*Lateral line:* goes to the centre of the base of the caudal fin.—*Colours:* back olive, rest of the body pinkish silvery; about twelve incomplete bars go from the back downwards towards the lateral line. The lower two-thirds of the vertical fins stained.

Hab.—Bengal, Bihár, N. W. Provinces and Asám. The species is said to attain 5 inches in length.

7. Barilius (*Pachystomus*) bendelisis.

Cyprinus bendelisis, Buchanan, Journ. Mysore, iii, p. 345, pl. 32, and Fishes of Ganges, pp. 270, 385; *McClelland, Ind. Cyp., pp. 297, 418.

Gobio bendilisis, *Cuv. and Val., xvi, p. 316.

Barilius bendelisis, Günther, Catal., vii, p. 288.

B. III. D. 2/7, P. 13, V. 9, A. 3/8, C. 19, L. l. 43, L. tr. 8/4.

Length of head 1/5, of caudal 1/5, height of body 2/9, of dorsal fin 1/6 of the total length.—*Eyes:* diameter 2/7 of length of head, 1 diameter from end of snout and apart. No pores on snout; the posterior extremity of the maxilla reaches to below the anterior third of the orbit. The third suborbital bone more than twice as high as the uncovered portion of the cheek below it. Four short barbels. Humeral process styliform and scarcely elongated.—*Fins:* dorsal much higher than its base is long, commencing slightly nearer the snout than the posterior extremity of the caudal, and not extending to over the anal; caudal forked, lobes rather pointed.—*Lateral line:* with 2½ rows between it and the ventral fin.—*Colours:* silvery, with greenish vertical bars, descending towards the lateral line; dorsal fin stained greyish in its centre, externally white; caudal likewise stained grey. Some of the scales have occasionally a black spot at their bases. Humeral process silvery.

Hab.—Mysore and Southern India, attaining 4½ inches in length.

8. Barilius (*Pachystomus*) cocsa.

Cyprinus cocsa, Ham. Buch., Fish. Ganges, pp. 272, 385, pl. 3, fig. 77.

chedra, Ham. Buch., l. c. pp. 273, 385; Gray and Hardw., Ill. Ind. Zool., (from H. B. MS.); McClell., Ind. Cyp. pp. 293, 409; *Cuv. and Val., xvi, p. 421.

tila, Ham. Buch., l. c. pp. 274, 385; *Cuv. and Val., xvi, p. 422.

Leuciscus cocsa, branchiatus, et *brachiatus,* McClell., Ind. Cyp., pp. 293, 294, 409, 411, pl. 42, fig. 5, *Cuv. and Val., xvi, p. 469.

Barbus cocsa, Cuv. and Val., xvi, p. 197.

Cyprinus apiatus, Val., in Jacq. Voy. Ind. Or., Atl., t. 15, fig. 3; McClelland Ind. Cyp., pp. 293. 408.

Leuciscus apiatus, Cuv. and Val., xvii, pp. 351, 495, pl. 510.

Opsarius dualis (?) Jerdon, M. J. L. and S., 1849, p 330.

Chedrus cocsa, Stein., Sitz. Ak. Wiss. Wien, 1867, lvi.

Barilius cocsa, Günther, Catal., vii, p 288.

Kholsa, Beng. *Puckwahree,* Panj. *Johra,* Mah.

B. III. D. $\frac{2}{7-8}$, P. 13, V. 9, A. $\frac{2}{7-8}$, C. 18, L. l. 42, L. tr. $\frac{8\frac{1}{2}-9}{5}$.

Length of head 1/4, of caudal 2/9, height of body nearly 1/4, of dorsal fin 1/6 of the total length.—*Eyes:* diameter 1/4 of length of head, 1 diameter from end of snout, and 1¼ apart. In large specimens the snout is generally covered with pores. The posterior extremity of the maxilla extends to below the anterior third of the orbit. Third suborbital bone as wide as the uncovered portion of the cheek below it. Humeral process generally very broad, and posteriorly produced in a lancet shaped form, more or less elongated in different specimens. Four short barbels.—*Teeth:* pharyngeal, 5, 4, 2/2, 4, 5.—*Fins:* dorsal much higher than its base is long, it commences midway between the snout and the centre of the caudal fin, and does not extend to over the anal; caudal forked, lower lobe the longer.—*Lateral line:* 2½ rows of scales between it and the base of the ventral fin.—*Colours:* silvery shot with purple; back of a slaty grey descending in bars towards the lateral line and most distinct in immature specimens. Each scale in adults with a black spot at its base, and two on each forming the lateral line. Fins whitish, tinged with orange. A grey margin to the dorsal and caudal, the lower lobe of which is sometimes stained black. Humeral process black-edged.

Hab.—Continent of India, not recorded from the Malabar coast. It attains 6 inches in length.

B. *With two barbels, (Bendilisis.)*

9. Barilius (*Bendilisis*) vagra.

Cyprinus vagra, Ham. Buch., Fish. Ganges, pp. 269, 385; *Cuv. and Val., xvi, p. 420.

Opsarius isocheilus, McClell., Ind. Cyp., pp. 298, 421, pl. 56, fig. 1, (H. B. MS.)

B. III. D. 2/7, P. 15, V. 9, A. $\frac{3}{10-11}$, C. 19, L. l. 42—45, L. tr. $\frac{6\frac{1}{2}}{4\frac{1}{2}}$

Length of head 1/5, of caudal 1/4, height of body 1/4, of dorsal fin 2/11 of the total length.—*Eyes:* diameter 1/3 of length of head, 3/4 of a diameter from end of snout, 1 diameter apart. The posterior extremity of the maxilla extends to below the middle of the orbit; the third suborbital

bone nearly touches the preopercular ridge. Two short rostral barbels. Humeral process short.—*Fins:* dorsal commences midway between the posterior margin of the orbit and the base of the caudal fin.—*Lateral line:* 1½ rows between it and the base of the ventral fin.—*Colours:* silvery with a light band and indistinct vertical bars.

Hab.—Bengal and N. W. Provinces, attaining 5 inches in length.

10. Barilius (*Bendilisis*) barila.

Cyprinus barila, Ham. Buch., Fish. Gang., pp. 267, 384; *Cuv. and Val., xvi, p. 418.
„ *chedrio*, Ham. Buch., l. c. pp. 268, 384; *Cuv. and Val., xvi, p. 419.
Opsarius anisocheilus, McClell., Ind. Cyp., pp. 298, 422, pl. 48, fig. 8.
Barilius morarensis, Günther, Catal., vii, p. 290.
„ *barila*, Günther, l. c. p. 291; Day, Proc. Zool. Soc. 1869, p. 378.

Gilland and *Caedra*, Beng. *Persee*, Hind.

B. III. D. $\frac{2}{7}$, P. 13, V. 9, A. $\frac{3}{10}$, C. 19, L. l. 43—46, L. tr. 6½/5.

Length of head 1/5, of caudal nearly 1/5, height of body 1/4, of dorsal fin 1/6 of the total length.—*Eyes:* diameter 2/7 of length of head, 1 diameter from end of snout and apart. The posterior extremity of the maxilla reaches to below the anterior third of the orbit. Third suborbital bone wide and nearly touching the preopercular ridge. Rostral barbels, small.—*Teeth:* pharyngeal, crooked, pointed, 5, 4, 3/3, 4, 5.—*Fins:* dorsal commences midway between the posterior margin of the orbit and the base of the caudal fin.—*Colours:* silvery, with fourteen or fifteen vertical blue bands in the middle third of the side of the fish.

Hab.—Bengal and Orissa, grows to 4 inches in length.

11. Barilius (*Bendilisis*) nigrofasciatus.

Barilius nigrofasciatus, Day, Proc. Zool. Soc. 1869, p. 620.
? *Cyprinus chapalio*, Ham. Buch, pp. 324, 390, *Cuv. and Val., xvi, p. 416.

B. III. D. 2/7, P. 15, V. 7, A. 2/11, C. 19, L. l. 30, L. tr. 7.

Length of head 2/11, of caudal nearly 1/3, height of body 2/7 of the total length.—*Eyes:* diameter nearly 1/2 of length of head, 1/4 of a diameter from end of snout, 1 diameter apart. Lower jaw prominent. No rostral barbels apparent, the maxillary extend to below the middle of the orbit.—*Fins:* dorsal situated over the first portion of the anal, and midway between the posterior extremity of the orbit and the base of the caudal, which last is lunated.—*Lateral line,* absent.—*Colours:* very similar to *B. rerio*, H. B. A dark band passes along the side of the body, and a second dotted line below it. Dorsal and anal spotted with black in lines. In some specimens the body is intensely blue.

Hab.—Pegu and Moulmein. Out of 20 specimens none exceeded 7/10 of an inch in length.

C. *Without barbels (Barilius).*

12. Barilius Bakeri, Pl. I, Fig. 2.

Barilius Bakeri, Day, Proc. Zool. Soc., 1865, p. 305, and Fish. Malabar, p. 218, pl. 18.

Pteropsarion Bakeri, Günther, Catal. vii, p. 284.

B. III. D. $\frac{3}{10}$, P. 15, V. 9, A. $\frac{2-3}{14}$, C. 17, L. l. 38, L. tr. 9/4.

Length of head 1/4, of caudal 2/9, height of body 2/7, of dorsal 1/6 of the total length.—*Eyes:* diameter about 1/4 of length of head, 1 diameter from end of snout, 1¼ diameters apart. Mouth compressed, lower jaw the longer, the posterior extremity of the maxilla extends to nearly below the centre of the orbit. Some pores exist along the margin of the lower lip, on the snout, and on the anterior edge of the preorbital. No barbels.—*Teeth:* pharyngeal, curved and pointed, 5, 4, 2/2, 4, 5.—*Fins:* dorsal commences nearly midway between the end of the snout and the base of the caudal, extending to above the fourth anal ray; caudal forked, lower lobe very slightly longer.—*Lateral line:* 2 rows of scales between it and base of the ventral fin.—*Colours:* greyish becoming white on the abdomen. A row of large bluish spots along the side. Dorsal, anal, and pectoral fins margined with white, and having dark grey bases. Caudal, grey in the centre.

Hab.—Hill ranges of Travancore, whence I received several specimens collected by the Rev. H. Baker. It attains six inches in length.

13. Barilius Canarensis.

Opsarius Canarensis, Jerdon, M. J. L. and S., 1849, p. 329.

Barilius Canarensis, Day, Proc. Zool. Soc., 1870, p. 374.

B. III. D. 2/10, P. 15, V. 9, A. $\frac{2}{13}$, C. 21, L. l. 38, L. tr. 9/4.

Length of head 2/9, of caudal 2/9, height of body 1/4 of the total length.—*Eyes:* diameter 1/4 of length of head, more than 1 diameter from end of snout. This species is very similar to the *B. gatensis*, C. and V., differing however in a few points: less rays in the dorsal fin, the lower caudal lobe decidedly the longer; the dorsal fin commences midway between the snout and the base of the caudal; the lower jaw the wider, the maxillary extends to below the anterior margin of the orbit. No barbels.—*Lateral line:* 2½ rows between it and the base of the ventral fin.—*Colours:* greenish above, golden on the sides, a double row of large green spots along the body as far as to above the base of the anal fin where they become confluent. Fins grey, with broad white margins.

Hab.—Canara on the Western coast; attaining 6 inches in length.

14. Barilius gatensis.

Leuciscus gatensis, Cuv. and Val., xvii, p. 309, pl. 503.
Opsarius gatensis, *Bleeker, Pro. Cyp., p. 288.
„ *Malabaricus*, *Jerdon, M. J. L. and S. 1849, p. 328.
Barilius gatensis, Günther, Catal. vii, p. 291; Day, Proc. Zool. Soc. 1870, p. 378.
Barilius rugosus, Day, Proc. Zool. Soc. 1867, p. 294; Günther, Catal. vii, p. 291.

Aart-candee, Tam. "River carp."

B. III. D. $\frac{2-3}{8}$, P. 15, V. 9, A. $\frac{3}{12-13}$, C. 18, L. l. 40, L. tr. 8/5.

Length of head nearly 1/4, of caudal a little above 1/6, height of body 1/4, of dorsal 1/8 of the total length.—*Eyes:* diameter 2/7 of length of head, 1 diameter from end of snout, 1¼ diameters apart. Cleft of mouth extending to below the centre of the orbit. The third suborbital bone is about three times as broad as the uncovered portion of the cheek below it. The anterior portion of the snout and the sides of the jaws covered with large glands; a few more likewise on the lower jaw. No barbels.—*Teeth:* pharyngeal, crooked, pointed, 5, 4, 2/2, 4, 5.—*Fins:* dorsal commences midway between the end of the snout and the middle of the caudal fin, extending to above the third anal ray. Caudal moderately lobed, the lower very slightly the longer.—*Lateral line:* 2 rows of scales between it and the base of the ventral fin.—*Colours:* silvery grey with about 15 vertical bars descending from the back. Dorsal and anal with dark bases and light margins. The females and young generally have smooth scales, whereas most of the adult males have one or more rough spots on each.

Hab.—Western Gháts and Neilgherry hills, attaining 6 inches in length.

15. Barilius tileo.

Cyprinus tileo, Ham. Buch., Fish. Gang. pp. 276, 385: *Cuv. and Val., xvi, p. 426.
Opsarius maculatus, McClell., Ind. Cyp. pp. 297, 417, pl. 47, f. 4.
„ *brachialis*, McClell., loc. cit. pp. 297, 418, pl. 48, fig. 6; *Cuv. and Val. xvi, p. 471.
Barilius tileo, Steind., Sitz. Ak. Wiss. Wien, 1867, lvi; Günther, Catal. vii, p. 287.

Tilei, Asám.

B. III. D. 2/8, P. 15, V. 9, A. $\frac{2}{12}$, C. 19, L. l. 70, L. tr. 14/5.

Length of head 2/9, of caudal 2/11, height of body 2/7 of the total length. The posterior extremity of the maxilla extends to below the anterior margin of the orbit. The third suborbital bone is more than twice as broad as the uncovered portion of the cheek below it. No barbels.—*Colours:* two rows of greenish blue spots along the sides.

Hab.—Bengal and Asám; attaining 8 inches in length.

16. Barilius papillatus.

Day, Proc. Zool. Soc. 1869, p. 378.

B. III. D. 3/7, P. 15, V. 9, A. $\frac{3}{10-11}$, C. 21, L. l. 39, L. tr. $\frac{7\frac{1}{2}-8\frac{1}{2}}{6\frac{1}{2}}$.

Length of head 1/5, of caudal 1/5, height of body 2/7, of dorsal fin 2/11, of the total length.—*Eyes:* diameter 1/3 of length of head, nearly 1 diameter from end of snout. Third suborbital bone thrice as deep as the uncovered portion of the cheek below. Humeral process rather narrow. The posterior extremity of the maxilla reaches to below the anterior margin of orbit. No barbels.—*Fins:* dorsal commences midway between the posterior margin of the orbit and the base of the caudal, its last ray is thickened and reaches the caudal when laid flat. The inner rays of the ventral are likewise thickened. Caudal with rounded lobes.—*Scales*, with a few elevated spots on each.—*Lateral line:* $3\frac{1}{2}$ rows of scales between it and the base of the ventral fin.—*Colours:* yellowish, the back grey, and from seven to nine broad and deep blue bands from the back to the abdominal profile. Dorsal fin stained grey in its upper third and caudal in its last third.

Hab.—Cossye river; attaining 3 inches in length. A variety exists in the Mahanuddi with the eye somewhat smaller, and the opercle narrower, but in other respects it agrees with the typical form. Also found at Bírbhúm in Bengal, where it is tolerably abundant in the Mora river.

17. Barilius bola. Pl. I, Fig. 3.

Cyprinus bola, Ham. Buch., Fish. Gang., pp. 274, 385; *Cuv. and Val., xvi, p. 423.

„ *goha*, Ham. Buch., loc. cit. pp. 275, 385: Gray and Hard. (from H. B. MSS.); *Cuv. and Val. xvi, p. 424.

Opsarius gracilis, McClell., Ind. Cyp., pp. 297, 419, pl. 47, fig. 1.

„ *megastomus*, McClell., loc. cit., pp. 298, 420, pl. 48, fig. 5.

Leuciscus salmoides, Blyth, J. A. S. of B. 1858, p. 289.

Barilius goha, Steind., Sitz. Ak. Wiss. Wien, 1867, lvi.

Bola goha, Günther, Catal. vii, p. 293.

Opsarius goha, Day, Proc. Zool. Soc. 1869, p. 379.

Bugguah, Uriah. *Korang*, Asám. *Bola*, Beng. *Buggarah*, Hind.

B. III. D. $\frac{3}{7}$, P. 13, V. 9, A. $\frac{3}{10}$, C. 19, L. l. 88, L. tr. $\frac{12-15}{9-11}$.

Length of head 2/9, of caudal 2/11, height of body nearly 1/5, of dorsal fin 1/8 of the total length.—*Eyes:* diameter 1/5 to 1/6 of length of head, $1\frac{1}{3}$ diameters from end of snout, and apart. Dorsal profile rather more convex than the abdominal. Head compressed, snout pointed, a well developed knob on symphysis of the lower jaw. Suborbital ring of bones wide, especially the third which is wider than the opercle. Mouth deeply cleft, the posterior extremity of the maxilla extending nearly one diameter of the

orbit behind the posterior margin of the eye. No barbels.—*Fins:* dorsal commences midway between the origin of the ventral and anal fins, its last ray being over the first of the anal. Caudal lobed, the lower lobe slightly the longer.—*Colours:* silvery with two or more vertical rows of bluish blotches along the sides, the upper being about twelve to fifteen, and the lower intermediate; some spots also on the head. Lower half of the dorsal fin slightly grey. Caudal orange, stained with grey and black. Pectoral, ventral, and anal orange, the colours being somewhat similar to those of a trout; it often goes by that name amongst Europeans.

Hab.—Orissa, Bengal, N. W. Provinces and Asám, attaining a foot in length.

18. Barilius guttatus.

Opsarius guttatus, Day, Proc. Zool. Soc. 1869, p. 620.

B. III. D. 2/7, P. 15, V. 9, A. 3/11, C. 17, L. l. 44, L. tr. 9/5.

Length of head 2/9, of caudal 2/9, height of body 2/11, of dorsal fin 2/13 of the total length.—*Eyes:* diameter nearly 1/5 of length of head, 1¼ diameters from end of snout and apart. Cleft of mouth deep, extending nearly one diameter behind the orbit. A well developed knob above symphysis of lower jaw. Suborbitals very broad, more especially the last which is nearly behind the vertical from the posterior margin of the orbit. No barbels.—*Fins:* dorsal commences midway between the posterior extremity of the orbit and the base of the caudal, being opposite the interspace between the ventral and anal fins. Caudal forked, lower lobe slightly the longer.—*Colours:* silvery, shot with purple, two rows of blue spots along the side. Lower caudal lobe orange, its upper lobe with a dark edging.

Hab.—Irawadi from Prome to Mandalay; attaining 7 inches in length.

19. Barilius interruptus.

Barilius interruptus, Day, Proc. Zool. Soc. 1869, p. 559.

B. III. D. 2/7, P. 10, V. 7, A. 2/12, C. 19, L. l. 34, L. tr. $\frac{6\frac{1}{2}}{4\frac{1}{2}}$.

Length of head 2/9, of caudal 1/5, height of body 2/7, of dorsal fin 2/11 of the total length.—*Eyes:* diameter 2/5 of length of head, rather more than 1/2 a diameter from end of snout, and 1 diameter apart. Lower jaw slightly the longer. Third suborbital bone about twice as wide as the uncovered portion of the cheek below it. The posterior extremity of the maxilla extends to below the anterior third of the orbit. Humeral process very slightly developed. No barbels.—*Teeth:* pharyngeal, uncinate, 5, 4, 2/2 4, 5.—*Fins:* dorsal commences in advance of the anal, and midway between the posterior margin of the opercle, and the base of the caudal fin, which latter is forked in its posterior three-fourths.—*Lateral line:* descends

gently for five scales, then more abruptly for two more, and having been continued along five more scales to above the ventral fin, it ceases.—*Colours:* silvery, with short vertical bars along the middle of the side. The upper scales with black spots.

Hab.—Hotha, whence Dr. J. Anderson brought many specimens measuring up to 2 inches in length, having collected them when attached to the Yunán expedition.

20. Barilius barna.

Cyprinus barna, Ham. Buch., Fish., Ganges, pp. 268, 384; *Cuv. and Val. xvi, p. 419.

Opsarius fasciatus, McClell., Ind. Cyp., pp. 269, 417, pl. 48, fig. 9.

,, *latipinnatus* et *acanthopterus*, McClelland, Ind. Cyp., pp. 298, 422,† pl. 48, fig. 7; *Cuv. and Val. xvi, p. 472.

Barilius barna, Günther, Catal. vii, p. 290; Day, Proc. Zool. Soc. 1869, p. 378.

Bahri, Uriah. *Balisundree*, Asámese.

B. III. D. $\frac{2}{7}$, P.13, V. 9, A. $\frac{3}{10}$, C. 19, L. l. 42, L. tr. $\frac{8-9}{5}$.

Length of head 1/5, of caudal 1/5, height of body 2/7, of dorsal fin 1/6 of the total length.—*Eyes:* diameter 2/5 of length of head, 2/3 of a diameter from end of snout, 1 diameter apart. Third suborbital bone twice as broad as the uncovered portion of the cheek below it. Humeral process slightly developed. The posterior extremity of the maxilla reaches to beneath the anterior third of the orbit.—*Fins:* the dorsal commences rather nearer the snout than the base of the caudal, its posterior rays, when laid flat, merely reach half way to the base of the caudal fin.—*Lateral line:* 2½ rows of scales between it and the base of the ventral fin.—*Colours:* nine bluish black vertical bands on the body. Dorsal and caudal fins tipped with black.

Hab.—Orissa, Bengal, Asám, attaining 4 inches or more in length. A variety exists in the Mahanuddi river, which has the dorsal fin more elevated, the eye slightly larger, and the cleft of the mouth a little greater.

21. Barilius borelio.

Cyprinus borelio, Ham. Buch., Fish. Ganges, pp. 336, 392; *Cuv. and Val., xvi, p. 443.

,, *solio*, Ham. Buch., loc. cit. pp. 337, 392; *Cuv. and Val., xvi, p. 444.

Boreli and *Soli*, Beng.

B. III. D. 2/7, P. 15, V. 9, A. 2/9, C. 18, L. l. 39, L. tr. 7/7.

Length of head nearly 1/5, of caudal 1/5, height of body 1/5 of the total length.—*Eyes:* diameter 2/7 of length of head, 1 diameter from end of

† McClelland in his errata directs *O. latipinnatus* to be substituted at p. 422 for *O. acanthopterus.*

snout. Suborbital ring of bones broad, the third nearly covering the cheek. The posterior extremity of the maxilla reaches to below the anterior third of the orbit. No barbels.—*Fins:* dorsal arises midway between the eye and the base of the caudal, its anterior rays as long as the head without the snout, the posterior rays extend half way to the caudal fin which is lobed.—*Scales:* $2\frac{1}{2}$ rows between the lateral line and the base of the ventral fin.—*Colours:* silvery, above tinged with green, lighter below; fins yellowish, the upper half of the dorsal stained greyish. Eyes silvery.

Hab.—Gangetic provinces; attaining 4 inches in length. The *Solio* is said to differ in its abdomen not being yellow, and having a scale-like appendant above both pectorals and ventrals.

22.* Barilius hoalius.

Cyprinus hoalius, Ham. Buch., Fish. Ganges, pp. 336, 392; *Cuv. and Val., xvi, p. 442.

Hayali, Beng.

B. III. D. 9, V. 9, A. 10.

" Form much compressed, straightish above and prominent below. * * * The head is small, the jaws equal in length, * * * the *lateral line* is bent parallel to the edge of the belly."—*Fins:* " The fin of the tail is divided into two lobes."—*Colours:* green above, silvery below.

Hab.—Rivers in Northern Bengal; attaining six inches in length.

Genus. Danio, *Ham. Buch.* sp. (see Pl. I.)

Perilampus sp., McClelland.
Paradanio et *Devario*, Bleeker.

Body compressed, abdomen rounded. Pseudobranchiæ present. Mouth narrow, directed obliquely upwards. Suborbitals broad. Barbels four, or two, or none. Pharyngeal teeth hooked, 5, 3, 2/2, 3, 5. *Dorsal fin moderately elongated, its posterior rays being opposite the anal which is long. Scales of moderate size. Lateral line concave, passing to the lower half of the tail. Gill rakers short.*

Geographical distribution.—These prettily marked little fish are found *throughout India, Burma,* and *Ceylon.*

Synopsis of Species.*

1. *Danio devario*, D. $\frac{3}{12-14}$, A. $\frac{3}{14-16}$, L. l. 41. No barbels. *Orissa, Bengal, Asám.*

spinosus, D. $\frac{2-3}{13}$, A. $\frac{3}{17}$, L. l. 32. No barbels, or a short rostral pair, One or two spines on the margin of the orbit. *Pegu.*

aurolineatus, D. $\frac{2}{12}$, A. $\frac{3}{15}$, L. l. 34—40. Rostral barbels. *South Malabar.*

4. „ *lineolatus*, D. $\frac{3}{10}$, A. $\frac{3}{14}$, L. l. 33. Rostral and maxillary barbels. *Sikkim, Tenasserim.*

5. „ *dangila*, D. 2/11, A. $\frac{3}{14}$. Two pairs of long barbels. *Bengal* and *Bihár.*

*6. „ *chrysops*, D. 13, A. 20. No barbels. *Bengal.*

7. „ *Neilgherriensis*, D. $\frac{3}{9-10}$, A. $\frac{2}{11-12}$, L. l. 35. Rostral and sometimes maxillary barbels. *Neilgherry Hills, Madras.*

8. „ *osteographus*, D. 2/11, A. $\frac{3-4}{13}$. L. l. 35—37. Rostral and usually maxillary barbels. *India* and *Ceylon.*

9. „ *æquipinnatus*, D. 13, A. 13, L. l. 32.

1. Danio devario.

Cyprinus devario, Ham. Buch., Fish. Ganges, pp. 341, 393, pl. 6, fig. 94; *Cuv. and Val., xvi, p. 446.

Perilampus devario, McClell., Ind. Cyp., pp. 288, 391, pl. 45, fig. 2.

Devario Macclellandii, *Bleeker, Proc. Cyp. p. 283.

Danio devario, *Günther, Catal. vii, p. 284; Day, Proc. Zool. Soc. 1869, p. 377.

Bonkuaso, Uriah; *Debari*, Beng.

B. III. D. $\frac{3}{12-14\ (17)}$, P. 13, V. 6, A. $\frac{3}{14-16}$, C. 19, L. l. 41, L. tr. 11/5.

Length of head 1/5, of caudal 1/4, height of body 1/3, of dorsal fin 1/5 of the total length.—*Eyes:* diameters 1/3 of length of head, 3/4 of a diameter from end of snout, 1¼ diameters apart. Posterior extremity of maxilla extends to beneath the anterior margin of the orbit; lower jaw the longer. Third suborbital bone broad. No barbels.—*Fins:* dorsal commences slightly anteriorly to the anal, and midway between the anterior margin of the orbit and the base of the caudal. In some specimens from Asám the anal had 19 rays. In a few from the Garo Hills there are D. 2/17, A 2/17.—Caudal lunated.—*Lateral line:* 2½ rows of scales between it and the base of the ventral fin.—*Colours:* greenish superiorly, silvery white inferiorly. The anterior part of the body is reticulated in its centre by steel-blue lines, divided from one another by narrow yellow bands. Three bluish lines are continued towards the caudal fin, where the two lower amalgamate, and passing upwards become lost on the superior half of the caudal fin.

Hab.—Orissa, Bengal, N. W. Provinces and Asám; attaining 4 inches in length.

2. Danio spinosus.

Day, Proc. Zool. Soc. 1869, p. 621.

B. III. D. $\frac{2-3}{13}$, P. 13, V. 7, A. $\frac{3}{17}$, C. 19, L. l. 52, L. tr. 15/4.

Length of head 1/5, of caudal 1/5, height of body 1/3 of the total length.—*Eyes:* diameter 2/7 of length of head, 1 diameter from end of

snout and apart. Body strongly compressed: a slight concavity over the occiput. Lower jaw prominent, having a strong hook fitting into an emargination in the upper jaw when the mouth is closed. In adults there is a sharp spine directed forwards above the anterior superior margin of the orbit, and a second broader and blunter before the centre of the anterior orbital margin. In immature examples these spines are equally sharp. No barbels.—*Fins:* the dorsal commences midway between the posterior extremity of the orbit and the base of the caudal, its first five or six rays are in advance of the anal. Caudal lunate.—*Lateral line:* 3½ rows of scales between it and the base of the ventral fin.—*Colours:* silvery, with an ill-defined lateral band, and some vertical yellow lines in the anterior half of the body. Dorsal and anal greyish, with reddish margins anteriorly. In the immature there is a dark humeral spot, and a steel-blue lateral band goes to the centre of the caudal fin, which has a scarlet stripe along the last half of its centre.

Hab.—Pegu; attaining four inches in length.

3. Danio aurolineatus, Pl. I, Fig. 1.

Perilampus aurolineatus, Day, Proc. Zool. Soc. 1865, p. 306.
„ *aradanio*, Day, Fishes of Malabar, p. 219, pl. xvii, fig. 2.
Danio malabaricus, Günther, Catal. vii, p. 283 (not Jerdon).

B. III. D. 2/12, P. 14, V. 7, A. 3/15, L. l. 34—40, L. tr. 8/4.

Length of head nearly 1/5, of caudal 1/5, height of body 1/3, of dorsal fin 1/7 of the total length.—*Eyes:* diameter 1/3 of length of head, 3/4 of a diameter from end of snout, 1 diameter apart. Lower jaw anterior, having a distinct knob at its extremity. Rostral barbels present, half as long as the eye.—*Teeth:* pharyngeal, curved, pointed 5, 4, 1/1, 4, 5.—*Fins:* dorsal commences nearer the snout than the posterior extremity of the caudal fin, and opposite the anal. *Colours:* three or four steel-blue lines pass along the body.

Hab.—South Malabar, attaining 3 inches in length.

4. Danio lineolatus.

Leuciscus lineolatus, Blyth, J. A. S. of Bengal, 1858, p. 289.
Perilampus affinis, Blyth, loc. cit. 1860, p. 163.
Danio lineolatus, Günther, Catal. vii, p. 282.

B. III, D. 3/10, P. 13, V. 8, A. 3/14, C. 19, L. l. 33, L. tr. 7½/3.

Length of head 1/4, height of body 1/4 of the total length.—*Eyes:* diameter 2/7 of length of head, 1 diameter from end of snout. Barbels well developed, the rostral ones being nearly as long as the eye, and the maxillary one-third shorter.—*Colours:* a dusky spot behind the gill covers.

Three straight bluish bands, divided from one another by yellow ones, pass along the sides to the tail.

Hab.—Sikkim and Tenasserim provinces. Mr. Blyth gives D. 12, A. 14, for *D. lineolatus*, and D. 13, A. 16, for *D. affinis*: as, however, I find those numbers in the former, as does also Dr. Günther, Catal. vii, p. 282, I have considered that some error must have occurred.

5. Danio dangila.

Cyprinus dangila, Ham. Buch., Fish. Ganges, pp. 321, 390; *Cuv. and Val. xvii p. 403.

Perilampus reticulatus, McClell., Ind. Cyp. pp. 290, 397, pl. 45, fig. 1, (from H. B.'s MSS-)

Danio dangila, *Bleeker, Atl. Ich. p. 29; *Günther, Catal., vii, p. 282.

B. III. D. $\frac{2}{10-11}$, P. 12, V. 7, A. $\frac{3}{14-15}$, C. 20, L. l. 38, L. tr. $\frac{7}{4\frac{1}{2}}$.

Length of head 1/5, of caudal 1/5, height of body 2/7 of the total length.—*Eyes:* diameter 1/3 of length of head, 3/4 of a diameter from end of snout. Lower jaw the longer, with a distinct knob at symphysis, mouth oblique. Rostral barbels a little shorter than the head; maxillary pair slightly longer.—*Fins:* the posterior dorsal rays are above the anterior ones of the anal. Caudal slightly emarginate.—*Colours:* back olive colour, abdomen silvery, sides with several narrow blue lines which in the anterior half, or two-thirds, of the body form a beautiful network; a dark spot behind gill covers. Anal fin with two or three blue stripes.

Hab.—Bengal and Bihár; grows to 5 or 6 inches in length. Darjíling.

6.* Danio chrysops.

Leuciscus chrysops, *Cuv. and Val., xvii, p. 308.

B. III. D. 13, A. 20, C. 19, L. l. 45.

Length of head 1/5, of body 3/11 of the total length.—*Eyes:* diameter 2/5 of length of head. Snout obtuse, upper jaw the longer.—*Fins:* dorsal and anal pointed; caudal slightly forked.—*Lateral line* curves downwards in the pectoral region.—*Colours* silvery.

Hab.—Bengal, size of recorded specimen 3 inches and 9 lines.

7. Danio Neilgherriensis.

Paradanio Nilgherriensis, Day, Proc. Zool. Soc. 1867, p. 296.

Danio Nilgherriensis, Günther, Catal. vii, p. 283.

Cowlie, Tamil.

B. III. D. $\frac{3}{9-10}$, P. 15, V. 9, A. $\frac{2}{11-12}$, C. 19, L. l. 35, L. tr. $\frac{6-7}{4}$, Vert. $\frac{12}{20}$.

Length of head 2/9, of caudal 2/9, height of body 1/4, of dorsal fin 1/8 of the total length.—*Eyes:* diameter 1/3 of length of head, 2/3 of a

diameter from end of snout, 1¼ diameters apart. Abdominal profile more convex than the dorsal one. Lower jaw anterior, with a slight knob at its extremity; a pair of short rostral barbels, and sometimes rudimentary maxillary ones.—*Teeth:* pharyngeal, crooked, pointed, 5, 4, 2/2, 4, 5.—*Fins:* dorsal commences midway between the end of the snout and the middle of the caudal fin, it extends to above the fourth or fifth anal ray. Caudal emarginate in its last fourth.—*Lateral line:* curves downwards in the pectoral region.—*Colours:* back greenish, sides silvery, with a purplish tinge along the abdomen; a badly marked broad, steel-blue stripe, extending from behind the eye to the caudal fin and bounded above and below by a narrow yellow edging.

Hab.—Rivers on Neilgherry Hills; attaining 3½ inches in length.

8. Danio osteographus.

Perilampus osteographus, McClelland, Ind. Cyp., pp. 289, 392, pl. 45, fig. 3, (erroneously numbered, pl. 56, fig. 9,) *Cuv. and Val. xvi, p 468.

? *Chela alburna*, Heckel, Fische Kaschmir, p. 390, c. fig.

Perilampus Malabaricus, Jerdon, M. J. L. & S. 1849, p. 325, (Male).

„ *Canarensis*, Jerdon, l. c. p. 325, (Female).

? „ *Mysoricus*, Jerdon, l. c. p. 325.

? *Danio alburnus*, *Günther, Catal. vii, p. 283.

„ *micronema*, Bleeker, Mem. Soc. Holl. Haarlem, 1864, Ceylon, p. 19, t. 4, fig. 2; Günther, Catal. vii, p. 282; Day, Proc. Zool. Soc. 1869, p. 560; 1870, p. 374.

„ *lineolatus*, Bleeker, l. c. p. 19, fig. 3.

Devario cyanotænia, *Bleeker, Prod. Cyp p. 283.

Paradanio aurolineatus, Day, Proc. Zool. Soc. 1867, p. 296.

B. III. D. 2/11, P. 15, V. 8, A. $\frac{3-4}{13}$, C. 19, L. l. 35—37, L. tr. 7½/3.

Length of head 2/11, of caudal 2/11, height of body 2/7, of dorsal fin 1/8 of the total length.—*Eyes:* diameter 1/5 of length of head, 1 diameter from end of snout. Rostral barbels half as long as the orbit, maxillary ones very short. In some specimens the latter are entirely absent.—*Colours:* back steel-blue; some irregular vertical yellow lines on the fore-part of the body, and three or four blue bands along the sides, the central ones coalescing, so as to form a broad bluish band down to the middle of the caudal fin.

Hab.—India and Ceylon; attaining 6 inches in length.

9. Danio æquipinnatus.

Perilampus æquipinnatus, McClelland, Ind. Cyp. p. 393, pl. 60, f. 1.

Pteropsarion æquipinnatus, *Günther, Catal. vii, p. 285.

B. III. D. $\frac{2}{10}$, P. 17, V. 8, A. $\frac{2}{12-14}$, C. 19, L. l. 32-34, L. tr. $\frac{7}{8\frac{1}{2}}$.

Length of head 1/5, of caudal nearly 1/5, height of body 1/4 of the total length.—*Eyes:* diameter 2/7 of length of head, 1 diameter from end of snout. Rostral barbels extend to the middle of the orbit, the maxillary ones

minute. Cleft of mouth oblique and extending to under the anterior margin of the orbit, a bluntish knob at the symphysis. Tongue thick and transversely corrugated. In large specimens, the posterior 2/3 of the inferior surface of the lower jaw is dilated, so that they nearly meet at the anterior extremity of the enlarged portion; a row of well-developed glands along the margin of the mandible.—*Fins:* the dorsal arises midway between the centre of the orbit and the base of the tail, extending to over the anterior anal rays, it is 2/3 as high as the body. Pectoral as long as head without the snout, reaching the ventral which last does not extend as far as the anal. Caudal forked.—*Colours:* several horizontal blue bars, the largest along the middle line of the body and continued on to the tail.

Hab.—Base of Garo Hills.

B. A PORTION OR THE WHOLE OF THE ABDOMINAL EDGE TRENCHANT.

a. Dorsal fin opposite the anal, which latter is elongated (9 *to* 21 *branched rays.)*

Genus PERILAMPUS, *McClelland.*

Paradanio, sp. Day.

Cachius et *Eustira*, Günther.

Pseudobranchiæ present. Body oblong, compressed, with a cutting abdominal edge. Mouth obliquely directed upwards. Barbels absent. Pharyngeal teeth in three rows 5, 4 or 3, 2 or 1/1 or 2, 3 or 4, 5 *uncinate. Dorsal fin rather short, without any osseous ray, and commencing opposite or behind the origin of the anal, which last has many rays. Scales of moderate size. Lateral line concave, passing to the lower half of the base of the caudal fin.*

Geographical distribution. Fresh waters of India, Ceylon, and Burma.

SYNOPSIS OF SPECIES.

1. *Perilampus atpar*, D. 2/7, A. $\frac{3}{19-21}$, L. l. 55. *India* generally, and *Burma.*
2. " *laubuca*, D 2/9, A. $\frac{2}{17-20}$, L. l. 34, *Orissa, Bengal*, and *Burma.*
3. " *Ceylonensis*, D. 2/10, A. $\frac{2}{15}$, L. l. 35. *Ceylon.*

1. PERILAMPUS ATPAR.

Cyprinus cachius, Ham. Buch., Fish. Ganges. pp. 258, 384 (young); *Cuv. and Val., xvi, p. 453.

Cyprinus atpar, Ham. Buch., l. c. pp. 259, 384, (adult); *Cuv. and Val. xvi, p. 454.

Perilampus cachius, McClell., Ind. Cyp. pp. 289, 396, pl. 46, f. 6.

" *psilopteromus*, McClell., l. c. f. 4, (from H. B. MSS.)

" *macropodus*, Jerdon, M. J. L. and S., 1849, p. 325.

Paradanio elegans, Day, Proc. Zool. Soc. 1867, p. 297.

Cachius atpar, Günther, Catal. vii, p. 339.

Bonkuaso, Uriah; *Nga-man-dan*, and *Ya-paw-nga* and *Nga-phyin-gyan*, Burmese; *Kachhi*, Beng.

B. III. D. 2/7, P. 10, V. 5-6, A. $\frac{3}{19-21}$, L. l. 55, L. tr. 11/4.

Length of head 1/6, of caudal 1/5, height of body 1/4 of the total length.—*Eyes:* diameter 1/4 of length of head, 3/4 of a diameter from end of snout, $1\frac{1}{2}$ diameters apart. Body strongly compressed, the abdominal edge being cutting. Cleft of mouth deep, oblique, extending nearly to beneath the anterior margin of orbit. Lower jaw the longer.—*Teeth:* pharyngeal, 5, 4, 1/1, 4, 5, crooked, pointed.—*Fins:* dorsal commences opposite the beginning of the second third of the anal. Pectoral elongate. Ventral with an elongated ray extending to the middle of the anal. Caudal forked, lower lobe the longer.—*Lateral line:* concave.—*Colours:* greenish with a silvery lateral band.

Hab.—Throughout India and Burma; attaining 4 inches in length.

2. Perilampus laubuca.

Cyprinus laubuca, Ham. Buch., Fish. Ganges, pp, 260, 384; *Cuv. and Val., xvi, p. 456.

? „ *dancena*, Ham. Buch., l. cit. pp. 342, 393.

Perilampus guttatus, McClell., Ind. Cyp., pp. 289, 394, pl. 45, f. 4 (erroneously marked pl. lvi, f. 10, from H. B.'s MSS.)

? „ *perseus*, McClell., l. c. pp. 289, 395, pl. 46, f. 5; *Cuv. and Val. xvi, p. 469.

Leuciscus laubuca, Bleeker, Verh. Bat. Gen. xxv, Beng. and Hind. p. 138.

Chela laubuca, Günther, Catal. vii, p. 335.

Perilampus laubuca, Day, Proc. Zool. Soc. 1869, pp. 380, 614.

„ *fulvescens*, Blyth, J. A. S. of B. 1860, p. 163; Day, Proc. Zool. Soc. 1869, p. 559.

Bankoe, Uriah; *Nga-me-loung*, Burmese; *Layubuka* and *Dankena*, Beng.; *Dannahrah*, Hind.

B. III. D. 2/9, P. 13, V. 7, A. $\frac{2}{17-20}$, C. 19, L. l. 34, L. tr. 7/5.

Length of head 1/6, of caudal 1/5, height of dorsal 1/8, of pectoral 1/3, of body 1/4 of the total length.—*Eyes:* high up, diameter 1/3 of length of head, nearly 1 diameter from end of snout, $1\frac{1}{4}$ diameters apart. Body strongly compressed with the abdominal edge cutting from the pectoral to the anal fin.—*Teeth:* pharyngeal, 5, 4, 1/1, 4, 5.—*Fins:* dorsal arises slightly posterior to the origin of the anal. Caudal deeply forked. Pectoral reaching anal.—*Lateral line:* curved downwards, $3\frac{1}{2}$ rows of scales between it and the base of the ventral fin.—*Colours:* silvery with some golden vertical stripes during life. Fine dots over the body, and a black mark, shot with green, above the base of the pectoral fin, and another at the base of the caudal, in which the last third of the lobes is, in Burmese specimens, tipped with black.

Hab.—Orissa, Bengal and Burma; attaining 3 inches in length.

3. Perilampus Ceylonensis.

Eustira Ceylonensis, Günther, Catal. vii, p. 331.

B. III. D. 2/10, P. 17, V. 7, A. $\frac{2}{15}$, C. 19, L. l. 35, L. tr. 7½/2.

Length of head 1/4, of caudal 1/4, height of body 1/4 of the total length.—*Eyes:* diameter 1/3 of length of head, 3/4 of a diameter from end of snout. Posterior extremity of maxilla extends to below the anterior margin of the orbit; lower jaw the longer.—*Fins:* origin of dorsal opposite commencement of anal. Pectoral reaching the ventral.—*Colours:* uniform silvery.

Hab.—Ceylon. The specimens in the British Museum are nearly 2 inches in length.

Genus. Chela, *Ham. Buch.* (Pl. I.)

Oxygaster, v. Hass.
Leuciscus, sp. Cuv. and Val.
Laubuca, *Macrochirichthys*, et *Paralaubuca*, Bleeker.

Body rather elongate and compressed; abdominal edge cutting. Pseudobranchiæ present. Mouth directed somewhat upwards, with the lower jaw prominent, and generally with a knob above the symphysis. Barbels absent. Pharyngeal teeth hooked and slender, in two or three rows. Dorsal fin short, without any osseous ray, situated principally or entirely opposite the anal which latter has an elongated base; pectorals long; caudal forked. Scales of moderate or small size. Lateral line concave.

Dr. Günther suggests the following sub-genera.

a. The trenchant thoracic edge anterior to the pectoral supported by the dilated bones of the forearm. Oxygaster.

α. Pharyngeal teeth in three rows. *Oxygaster.*

β. „ „ two „ *Macrochirichthys.*

b. The thoracic edge not supported by the dilated bones of the forearm. Securicula.

Geographical distribution: India, Burma and extending almost throughout Asia. Generally termed *Vellache-candee* in Tamil; *Bay-ree-saio*, and *Baarsee*, Tel.; *Bounce-putti*, Uriah; *Took*, Panjáb.

Synopsis of Species.

1. *Chela Sladoni*, D. 2/8, A. 2/19, L. l. 68, L. tr. 10/8. *Burma.*
2. „ *argentea*, D. $\frac{2-3}{7}$, A. $\frac{3}{14-15}$, L. l. 43—45, L. tr. $\frac{6\frac{1}{2}}{3}$. *Southern India.*
3. „ *bacaila*, D. 2/7, A. $\frac{2}{12-13}$, L. l. 110. *Bengal, &c.*
*4. „ *novacula*, D. 9, A. 17, L. 60, L. tr. 15/3. *India.*
5. „ *flavipinnis*, D. 2/7, A. $\frac{3}{14-16}$, L. l. 65, L. tr. 9/5. *Southern India.*
6. „ *untrahi*, D. 2/7, A. 3/17, L. l. 52, L. tr. 7/5. *Orissa.*

7. „ *phulo*, D. 2/7, A. 3/17, L. l. 87, L. tr. 12/6. *Bengal, Orissa, &c.*
8. „ *Sardinella*, D. 2/7, A. 2/19, L. l. 48, L. tr. $\frac{7\frac{1}{2}}{4}$. *Burma.*
*9. „ *Panjábensis*, D. $\frac{2}{7}$, A. $\frac{3}{14}$, L. l. ca. 110, L. tr. 12/9. *Panjáb.*
10. „ *alkootee*, D. 10, A. 10. *Dekhan.*
*11. „ *jorah*, D. 10, A. 11. *Dekhan.*
12. „ *teekanee*, D. 10, A. 14. *Dekhan.*
13. „ *gora*, D. 3/7, A. 2/13, L. l. 140—160. *Bengal, Orissa, &c.*
14. „ *clupeoides*, D. $\frac{2}{7-8}$, A. $\frac{2}{12-13}$, L. l. 80, L. tr. $\frac{13\frac{1}{2}}{6\frac{1}{2}}$. *Southern India.*

1. Chela Sladoni.

Day, Proc. Zool. Soc. 1869, p 622.

B. III. D. 2/8, P. 11, V. 8, A. 2/19, C. 21, L. l. 68, L. tr. 10/8.

Length of head 1/6, of caudal 1/5, height of body 1/4 of the total length.—*Eyes :* diameter 2/7 of length of head, 3/4 of a diameter from end of snout. Edge of thorax rounded; the serrated abdominal margin commences opposite the base of the pectoral fin. Posterior extremity of the maxilla reaches to beneath the anterior third of the orbit. Suborbital ring of bones is half as deep as the diameter of the orbit.—*Teeth :* pharyngeal, crooked 5, 4, 2/2, 4, 5.—*Fins :* dorsal commences opposite the anal; lower caudal lobe the longer.—*Colours :* silvery, caudal black edged.

Hab.—Irrawaddi in Burma, extending northwards as far as Mandalay.

2. Chela argentea.

Day, Proc. Zool. Soc. 1867, p. 301; Günther, Catal. vii, p. 334.
? *Pelecus diffusus*, Jerdon, M. J. L. and S. 1849, p. 327.
? *Chela diffusa*, *Günther, Catal. vii, p. 334.

Wellachee-candee, Tam. "The white carp."

B. III. D. $\frac{2-3}{7}$, P. 15, V. 8, A. $\frac{3}{14-15}$, C. 19, L. l. 43—45, L. tr. 6½/3.

Length of head nearly 1/5, of pectoral rather above 1/5, of caudal a little more than 1/5, height of body above 1/5, of dorsal fin nearly 1/9 of the total length.—*Eyes :* diameter not quite 1/3 of length of head, nearly 1 diameter apart and from end of snout. Cleft of mouth extending to below the anterior third of the orbit, a knob at the end of the lower jaw. Suborbital ring of bones broad and covering the cheek, the third being as wide as the preorbital. The median edge in front of the pectoral fins is not supported by the dilated bones of the fore-arm. Thorax without a sharp edge.—*Fins :* dorsal situated in the posterior third of the distance between the snout and the base of the caudal fin, extending to over the commencement of the anal. Dorsal and anal highest anteriorly. Caudal deeply lobed.—*Lateral line :* descends gently in the first twelve scales, finally attaining the centre of the

caudal.—*Teeth:* pharyngeal, curved, pointed, 5, 3, 2/2, 3, 5. *Colours*, silvery with a lateral band which fades after death.

Hab.—Bowany river at the base of the Neilgherries, attaining 6 inches in length.

Dr. Jerdon gives about 50 scales in *C. diffusa*, along the side, and observes that his species is found in the Cauvery and all its tributaries. I did not obtain it in the lower portions of the Cauvery, but *C. argentea* was likewise absent, and I suspect the two are identical.

3. Chela bacaila.

Cyprinus bacaila, Ham. Buch., Fish. Ganges, pp. 265, 384, pl. 8, fig. 76; *Cuv. and Val. xvi, p. 460.

Opsarius bacaila, McClell., Ind. Cyp. pp. 295, 414.

" *leucerus*, McClell., loc. cit. pp. 295, 415, pl. 47, fig. 3; *Cuv. and Val., xvi, p. 470.

Leuciscus bacaila, Bleeker, Verh. Bat. Gen. xxv, Beng. and Hind. p. 137.

" *cultellus*, Cuv. and Val., xvii, p. 341, pl. 507.

Pelecus cultellus, Jerdon, M. J. L. and S. 1849, p. 326.

Chela bacaila, Günther, Catal. vii, p. 332; Day, Proc. Zool. Soc. 1869, p. 382.

Jellahri, Uriah. *Chelliah*, Hind.

B. III. D. 2/7, P. 13, V. 9, A. $\frac{2}{12-13}$, C. 19, L. l. 110.

Length of head 1/6, of caudal 2/9, height of body 2/11 of the total length.—*Eyes:* snout slightly longer than the eye. Bones of the fore-arm not dilated, and not supporting the abdominal edge anterior to the pectoral fin. Suborbital ring of bones broad, nearly covering the cheek.—*Teeth:* pharyngeal 5, 4 or 3, 2/2, 3 or 4, 5.—*Fins:* first anal ray is below the middle of the dorsal fin.—*Scales:* extend forwards on the head to nearly opposite the posterior margin of the orbit.—*Colours:* uniform silvery.

Hab.—Throughout India except Malabar. It may exist according to Dr. Günther in Moulmein, but I could not find it there. It attains six inches in length.

4. *Chela novacula.

Leuciscus novacula, Val. in Jacq. Voy. Ind., pl. 15, fig. 2; Cuv. and Val. xvi; p. 345.

Chela novacula, *Günther, Catal. vii, p. 334.

B. III. D. 9, A.? 17, L. l. 60, L. tr. 15/3.

Length of head 1/5, height of body 1/5 of the total length.—*Eyes:* large.—*Teeth:* pharyngeal—5, 4, 3/3, 4, 5.—*Fins:* dorsal above the anterior anal rays; the pectorals nearly reach the ventrals.—*Colours:* silvery.

Hab.—India.

5. Chela flavipinnis.

? *Leuciscus scapellus*, Cuv. and Val. xvii, p. 347.
Pelecus flavipinnis, Jerdon, M. J. L. and S. 1849, p. 327.
Chela flavipinnis, Day, Proc. Zool. Soc. 1869, p. 382.

B. III. D. 2/7, P. 13, V. 9, A. $\frac{3}{14-16}$, C. 19, L. l. 65, L. tr. 9/5.

Length of head 1/6, of pectoral 2/9, of caudal 2/11, height of body 1/5, of dorsal fin 1/12 of the total length.—*Eyes:* diameter 1/3 of length of head, 3/4 of a diameter from end of snout, 2/3 of a diameter apart. Cleft of mouth oblique, knob on symphysis well developed. Suborbital ring of bones half the width of the diameter of the orbit, and nearly covering the cheek; five small crenulations along the lower preopercular margin.—*Teeth:* pharyngeal, 5, 4, 2/2, 4, 5.—*Fins:* dorsal situated over the anterior anal rays; caudal lobed, the lower lobe the longer.—*Gill rakers:* short. The bones of the fore-arm do not support the thoracic edge.—*Lateral line:* continuous, eventually attaining the centre of the caudal fin.—*Colours:* silvery; fins tipped with orange.

Hab.—Cauvery and Coleroon rivers in Madras Presidency.

6. Chela untrahi.

Day, Proc. Zool. Soc. 1869, p. 381.

Untrahi, Uriah.

B. III. D. 2/7, P. 13, V. 7, A. 3/17, C. 17, L. l. 52, L. tr. 7/5.

Length of head 1/6, of pectoral 1/5, of caudal 1/5, height of body 1/5, of dorsal 1/9 of the total length.—*Eyes:* upper margin near the profile, diameter 1/3 of length of head, 2/3 of a diameter from end of snout, nearly 1 diameter apart. Dorsal profile nearly horizontal; abdominal profile with a cutting edge from opposite the base of the pectoral fin. Mouth very oblique, knob on symphysis minute. Lower jaw in advance of the upper, the maxilla extending to below the anterior margin of the orbit. Suborbital ring of bones moderately wide.—*Fins:* pectorals reaching ventrals, and a dilated humeral supports a smooth thoracic edge. Dorsal arises midway between the posterior margin of the orbit and the posterior extremity of the caudal fin, and situated over the anterior anal rays. Caudal lobed, the lower lobe the longer.—*Scales:* deciduous, extending forwards on the nape to opposite the posterior margin of the orbit.—*Lateral line:* curves downwards, 1 row of scales between it and base of ventral fin; it ceases a few scales anterior to the caudal fin.—*Colours*, silvery.

Hab.—Mahánadi river; attaining five inches in length.

7. Chela phulo.

Cyprinus phulo, Ham. Buch., Fish. Ganges, pp. 262, 384; *Cuv. and Val. xvi, p. 457.

Opsarius albulus, McClell., Ind. Cyp., pp. 296, 416, pl. 48, fig. 10.
Chela Owenii, Sykes, Trans. Zool. Soc. 1841, p. 361, pl. 63, fig. 1.
Pelecus Owenii, *Jerdon, M. J. L. and S. 1849, p. 328.
Chela phulo, *Günther, Catal. vii, p. 334; Day, Proc. Zool. Soc. 1869, p. 381.

Phul chela, Beng. *Dunnahree*, Hind. *Took*, Panj.

B. III. D. 2/7, P. 13, V. 9, A. $\frac{3}{17}$, C. 19, L. l. 87, L. tr. 12/6.

Length of head 2/11, of pectoral 1/5, of caudal above 1/5, height of body 1/5 of the total length.—*Eyes :* diameter 2/5 of length of head, 1/2 a diameter from end of snout, 1 diameter apart. Abdominal profile cutting posteriorly to the base of the pectoral fin. Third suborbital bone two-thirds as deep as the uncovered portion of the cheek below it. The maxilla extends to under the hinder margin of the orbit.—*Fins :* dorsal commences midway between the posterior extremity of the orbit and the posterior extremity of the caudal fin, and slightly behind the origin of the anal. Caudal deeply forked, lower lobe the longer.—*Lateral line :* curves gently downwards.—*Colours :* silvery, with a bright silvery lateral band.

Hab.—Bengal, Orissa and Central India as far southwards as the Tamboodra and Kistna rivers; attaining 4 inches in length.

8. Chela sardinella.

Leuciscus sardinella, Cuv. and Val., xvii, p. 344.
Chela sardinella, *Günther, Catal. vii, p. 338.

B. III. D. 2/7, P. 13, V. 8, A. $\frac{2}{19}$, L. l. 48, L. tr. $\frac{7\frac{1}{2}}{4}$.

Length of head 1/6, of pectoral 1/6, of caudal above 1/6, height of body 2/9 of the total length.—*Eyes :* diameter 2/7 of length of head; 1 diameter from end of snout; nearly 1 diameter apart. The bones of the fore-arm are not dilated and do not support the thoracic edge which is smooth, the keeled portion commencing opposite the pectoral fin. Suborbital ring of bones broad.—*Teeth :* pharyngeal, 5, 4, 3/3, 4, 5.—*Fins :* dorsal commences above the anterior anal rays.—*Colours*, silvery.

Hab.—Irawati river at Rangoon; to 6 inches in length.

9. Chela Panjábensis.

Took, Panj.

B. III D. 2/7, P. 11, V. 6, A. $\frac{3}{14}$, C. 19, L. l. ca. 110, L. tr. 12/9.

Length of head 1/6, of caudal 1/6, height of body 2/9 of the total length. —*Eyes :* diameter 2/5 of length of head; 1/2 a diameter from end of snout. The posterior extremity of the maxilla extends to nearly beneath the anterior margin of the orbit. Lower jaw the longer. The suborbital ring of bones is broad, and the third three times as deep as the uncovered portion of the cheek below it. Dorsal profile nearly horizontal; abdominal edge cutting

from opposite the base of the pectoral fin.—*Fins:* dorsal arises midway between the posterior margin of the opercle, and the posterior extremity of the lobes of the caudal. Pectoral longer than the head, but does not quite reach the base of the ventral, which last fin only extends half the distance to the anal. Lower lobe of caudal the longer.—*Scales:* moderately deciduous, they extend forwards to opposite the suborbital ring of bones; there is a slight elevation along the centre of each; 5½ rows between the lateral line and the base of the ventral fin.—*Colours:* silvery with a burnished silvery band along the side.

Hab.—Lahore, in the Ravi river. In appearance it is very similar to the *C. phulo*, H. B.

10. *Chela alkootee.

Sykes, Trans. Zool. Soc. 1841, p. 362.

B. III. D. 10, P. 10, V. 7, A. 10.

"Sides slightly compressed; the back and belly rounded; back straight." —*Fins:* "lobes of the tail sharp, lowest the longest."—*Scales:* "excessively minute."—*Lateral line:* "quite straight."—*Colours:* "the gill covers quite smooth, and of a polished silver; pupils black; a black circle surrounds the eyes, and there is a patch of faint yellow on the forehead; all the rest of the fish is of a silver white colour, and the body is semi-diaphanous."

Hab.—Dekhan; attaining 1 inch in length.

11. *Chela jorah.

Sykes, Trans. Zool. Soc. ii, p. 361.

B. III. D. 10, P. 12, V. 8, A. 11, C. 18.

"A somewhat compressed fish; straightish back, convex belly."—*Colours:* "back dark, with a purplish shade, softening into silver down the sides and abdomen."

Hab.—"Found abundantly in the Beema river, near Pairgaon."

12. *Chela teekanee.

Sykes, Trans. Zool. Soc. ii, 1841, p. 362.

B. III. D. 10, P. 12, V. 9, A. 14, C. 8.

"A compressed fish; back very slightly arched; snout nearly in a continuation of the same line; body deep; belly convex."—*Fins:* "dorsal situated far back."—*Colours:* "on the back light reddish brown, softening into silver."

Hab.—Beema river at Pairgaon; attaining 2½ inches in length.

13. Chela gora, Pl. I, Fig. 4.

Cyprinus gora, Ham. Buch., Fish. Ganges, pp. 263, 384; *Cuv. and Val, xvi, p. 458.

Opsarius pholicephalus, McClell., Ind. Cyp. pp. 295, 415, pl. 47, fig. 2.

Chela gora, Günther, Catal. vii, p. 332; Day, Proc. Zool. Soc. 1869, p. 381.

Hum-catchari, Uriah. *Ghora chela,* Beng. *Chel-hul,* Hind. *Bounchi* and *Kundul,* Panj.

B. III. D. 3/7, P. 15, V. 9, A. $\frac{2}{13}$, C. 19, L. l. 140—160, Vert. 46.

Length of head 1/5, of caudal 1/6, height of body 1/5 of the total length.—*Eyes:* diameter 1/5 of length of head, 1½ diameters from end of snout, 1¼ diameters apart. The bones of the fore-arm do not support the abdominal edge, the keeled portion of the abdominal profile commences posterior to the ventral fin. Suborbital ring of bones broader than the diameter of the eye, but only covering two-thirds of the cheek.—*Teeth:* pharyngeal, 5, 3, 1/1, 3, 5.—*Gill rakers:* very short, curved, 8 in the lower branch of the outer bronchial arch.—*Fins:* dorsal commences slightly in advance of the anal.—*Scales:* extend forwards on the head to above the nostrils.—*Colours:* silvery.

Hab.—Bengal, Orissa and Asám; attaining 8 inches in length.

14. Chela clupeoides.

Cyprinus clupeoides, Bloch, xii, p. 49, t. 408, fig. 2.

Clupea cyprinoides, Schn., in Bloch. Syst. Ich. p. 427.

Chela balookee, Sykes, Trans. Zool. Soc. ii, p. 360.

Leuciscus clupeoides, Cuv. and Val. xvii, p. 342.

,, *Dussumieri,* Cuv. and Val. xvii, pl. 508.

? ,, *acinaces,* Cuv. and Val. xvii, p. 347, pl. 509.

Pelecus affinis, Jerdon, M. J. L. and S. 1849, p. 327.

Chela clupeoides, *Günther, Catal. vii, p. 333.

Netteli, Tam.

B. III. D. $\frac{2}{7-8}$, P. 13, V. 9, A. $\frac{2}{12-13}$, C. 19, L. l. 80, L. tr. $\frac{13\frac{1}{2}}{6\frac{1}{2}}$.

Length of head from 2/9 to 1/5, of pectoral 1/5, of caudal 2/11, height of body 2/11, of dorsal fin 1/10 of the total length.—*Eyes:* diameter 1/3 of length of head, 1 diameter from end of snout, 3/4 of a diameter apart. Rather a strong knob on symphysis; opercle as broad as high. Abdominal edge trenchant.—*Teeth:* pharyngeal, 5, 4, 2/2, 4, 5.—*Fins:* dorsal situated in the posterior 2/5 of the body, and very slightly in advance of the anal. Caudal lobed, the lower lobe the longer.—*Scales:* deciduous and placed in sinuous rows.—*Lateral line:* at its termination passes upwards to the upper portion of the inferior lobe of the caudal fin.—*Colours:* silvery.

Hab.—Madras Presidency, Mysore and the Dekhan; attaining 6 inches in length, and very good eating.

II. *Sub-Fam.* HOMALOPTERINA.

Apalopterinæ, McClell.

Pseudobranchiæ absent. Body elongated and depressed anteriorly, having a broad smooth abdomen. Snout prominent before the mouth, which latter is small, transverse, inferior and central, with fleshy lips. Barbels present. Branchial aperture vertical and narrow. Pharyngeal teeth in a single row, conical. Pectoral and ventral fins horizontal, forming half discs. Body scaled. Air bladder absent.

Geographical distribution.—Streams and mountain torrents in the Hills of India, and extending as far as Java and Sumatra.

Only one known genus.

Homaloptera, 6 barbels, none on mandibles.

12. *Genus.* Homaloptera, *v. Hass.*

Balitora, Gray.
Platycara, McClelland.

Head and anterior part of body depressed; snout more or less spatulate. Mouth small, inferior, with two pairs of rostral barbels, and one at either angle of the mouth. Pharyngeal teeth small, from 5 to 16 in one row. Pectoral and ventral fins with many rays, the outer of which are simple. Dorsal short, situated opposite to the ventrals; anal likewise short.

Geographical distribution.—Java and Sumatra, and through some of the hilly districts of the Himalayas to the Wynaad in Madras Presidency.

Synopsis of Species.

1. *Homaloptera Brucei*, D. 3/8, A. 2/5, L. l. 70. Brown blotched with darker. *Wynaad hills in Madras.*
2. „ *maculata*, D. 11, A. 2/5, L. l. 78. *Butan* and *Khasi Hills.*
3 „ *bilineata*, D. 9, A. 6. Horizontal bands. *Tenasserim Provinces.*

1. Homaloptera Brucei.

Balitora Brucei, Gray and Hard., Ind. Zool.; *McClelland, Ind. Cyp., p. 299, 428, pl. 49, fig. 1. (From Gray and Hard.); *Cuv. and Val. xviii, p. 101.

Platycara australis, Jerdon, M. J. L. and S., 1849, p. 333.

Homaloptera Brucei, Day, Proc. Zool. Soc. 1867, p. 348; Günther, Catal. vii, p. 340.

Cal-case-dee, Tam. "Stone carp.".

B. III. D. 3/8. P. 19, V. 9, A. 2/5, C. 17, L. l. 70.

Length of head 1/6, of caudal 1/6, height of body 1/7 of the total length.—*Eyes*: directed upwards and outwards, diameter 1/5 of length of head, 3 diameters from end of snout, 2 diameters apart. Snout broad, depressed; lips fringed. Rostral barbels short, their length equalling about

2/3 of the diameter of the orbit, the pair at the angle of the mouth thicker and slightly longer.—*Teeth:* pharyngeal, in one row, 5/5.—*Fins:* dorsal highest in front, arising midway between the end of the snout and the base of the caudal. Pectoral nearly reaching the ventral. Caudal lobed in its posterior third.—*Scales:* cycloid.—*Lateral line:* complete.—*Colours:* dull olive, becoming yellowish beneath. Large brown blotches on the body. Dorsal fin with three rows of dull spots; pectoral and ventral with three or four, anal with two, caudal with three irregular bands, and black tips.

Hab.—Wynaad; 8 specimens taken up to $3\frac{1}{2}$ inches in length.

2. Homaloptera maculata.

Balitora maculata, Gray and Hard., Ind. Zool.; *Cuv. and Val. xviii, p 102.
Platycara maculata, McClell., Ind. Cyp. pp. 299, 427, pl. 49, fig. 2. (From Gray and Hard.)
,, *anisura*, McClell., Cal. Journ. Nat. Hist. ii, p. 587, pl. 16, fig. 1.
Homaloptera maculata, Günther, Catal. vii, 340.

B. III. D. 3/8, P. 21, V. 11, A. 2/5, C. 17, L. l. 70, L. tr. 10/7.

Length of head 2/13, of caudal 1/5 of the total length.—*Eyes:* $2\frac{1}{2}$ diameters from end of snout, 1 diameter from end of opercle. Snout broad and depressed, with sharp margins; rostral and maxillary barbels small.—*Teeth:* pharyngeal, conical, in one row, 15/15.—*Fins:* pectoral nearly reaches the ventral, its anterior nine rays are unbranched, as are also the first two of the ventral. Lower caudal lobe the longer.—*Scales:* absent from chest and as far as the posterior margin of the base of the ventrals.—*Colours:* dark brown with darker blotches; caudal banded.

Hab.—Himalayas from about Darjeeling through Bután, Asám and the Khasi Hills.

3.* Homaloptera bilineata.

Blyth, J. A. S. of Bengal, 1860, p. 172.

B. III. D. 9, A. 6.

Said to be affined to *H. erythrorhina*, Cuv. and Val., xviii, pl. 524.

" A minute knob on the muzzle."—*Colours:* " A narrow dark line from the muzzle to eye, continued behind the eye as a broad, irregular, somewhat zigzag band, set off laterally with whitish, and joining its opposite behind the dorsal fin. A corresponding but obscure band below the lateral line, little seen on the hind half of the body. Dorsal with a large blotch of black, and one small posterior spot. Caudal fin also black, with the sides of its base and the forking tips white (or yellow?), but the extreme tips black. Pectorals, ventrals, and anal, blotched with black; sides of body somewhat nigrescent."

Hab.—Tenasserim provinces; the largest specimen obtained was $2\frac{3}{4}$ inches long.

(To be continued.)

Account of a visit to the Eastern and Northern Frontiers of Independent Sikkim, with Notes on the Zoology of the Alpine and Sub-alpine regions, Part II, Zoology,—*by* William T. Blanford, F. G. S., C. M. Z. S.

(Received 29th September, 1871.)

The present paper will contain notes on the Vertebrata collected, or observed, in the Alpine and Sub-alpine portions of Independent Sikkim, a few remarks being added on some of the animals inhabiting the neighbouring regions in Tibet. Only those species will be noticed which are found in the region of pine forests, or in the Rhododendron bushes and open ground above the limit of trees, and consequently no animals will as a rule be mentioned which are not found above 10,000 feet on the eastern Cholá ranges, and above 8,000 feet in Northern Sikkim. This elevation, which is about the lower limit of pines, is also a fair approximation to a boundary line between the two faunas which meet in the Eastern Himalayas, the Malay and the Palæarctic.

The fauna of the plains of India appears to penetrate deeply into the Western Himalayas and to meet the Palæarctic fauna; but, as a rule, it stops suddenly at the base of the mountains in Sikkim. A few birds found in the outer valleys are species which inhabit the Indian Peninsula, but they form but a very small percentage of the avi-fauna; the great bulk of the animals of every class are either peculiar to the South-western Himalayas, or common to it and the Malay Peninsula. The most striking characteristic of the fauna of India proper is the presence of numerous forms with western and generally African affinities, such as *Hyæna*, *Canis*, *Mellivora*, *Lepus*, *Antilope*, *Gazella*, amongst mammals; *Neophron*, *Aquila*, (restricted,) *Thamnobia*, *Malacocircus*, *Pastor*, *Ammomanes*, *Pyrrhulauda*, *Calandrella*, *Pterocles*, *Cursorius*, amongst birds; *Cabrita*, *Ophiops*, *Sitana*, *Eryx*, *Echis*, amongst reptiles; *Cyclotopsis* amongst land mollusca, &c. All of these disappear in the Himalayas of Sikkim, and their place is taken by a far richer fauna. Amongst the mammals *Arctonyx*, *Helictis*, *Arctictis*, *Urva*, *Rhizomys* and *Nemorhœdus*, almost all Malayan forms, make their appearance; amongst birds the sub-families *Eurylaiminæ*, *Leiotrichinæ*, *Macropyginæ*, *Phasianinæ*, entirely unrepresented in India, are found, whilst the number of *Picidæ*,* *Cuculidæ*, *Capitonidæ*, *Nectarinidæ*, *Crateropidæ*,

* In the plains of India exclusive of Malabar there are 12 species of Woodpeckers enumerated as found by Jerdon. All except two or three being very local. In tropical and temperate Sikkim alone 17 are found. Of the *Timalinæ* of Jerdon 13 are found in various parts of India exclusive of Malabar, nine are peculiar to Malabar, and no less than 48 have been found in the South-eastern Himalayas.

Muscicapidæ, *Merulidæ* (especially *Ruticillinæ*), *Pycnonotidæ* and *Treronidæ* is greatly increased.

In the higher elevations of Sikkim, an entirely distinct fauna appears, which is almost purely Palæarctic, although a few Malayan types are met with. *Arctomys*, *Lagomys*, *Moschus* and *Ovis* appear amongst the mammals, whilst nearly all the species found at lower elevations disappear. Of the birds, scarcely any of the *Picariæ*, and only a single species of the *Timalinæ* are found at 12,000 feet; the *Pycnonotidæ* and *Treronidæ* are wanting, and the only families which gain in numbers are the *Cinclidæ*, *Fringillidæ*, and *Phasianidæ*. Amongst the genera which are deficient at the lower elevations, but common in the higher ranges, are *Gypaëtus* *Troglodytes*, *Lophophanes*, *Accentor*, *Propasser*, *Nucifraga*, *Fregilus*, *Ithagenis* and *Lerva*.

The principal object of my visit to the higher ranges of Sikkim was to examine and collect this Palæarctic fauna, and the principal result has been to ascertain that in these mountains two well marked sub-divisions of it are found: one inhabits the damper southern slopes of the hills, while the other is peculiar to the dry Tibetan climate. The latter we only entered in the upper Láchen valley, close to Kongra Lama, and to it belong the peculiar forms, *Otocoris Elwesi*, *Leucosticte hæmatopygia*, *Montifringilla ruficollis*, *Fregilus pyrrhocorax*, *Cinclus sordidus* and *Accentor rubeculoides*.

A second object in my visit was to learn, so far as practicable, which of the migratory Passerine birds, found in the Indian plains in the winter, breed in the South-west Himalayas. My journey was undertaken rather too late in the year to render it at all probable that I should find any birds actually breeding, but still, as I was amongst the higher ranges at the migrating season, I had some opportunity of seeing which birds were previously there, and which appeared to arrive from the north. The result, so far as I was enabled to make observations, is rather surprising; for it appears probable that scarcely any of the Indian migratory birds breed in Sikkim, but, in some cases, species which visit India during the winter and cross the Himalayas to breed, are represented by allied forms which rarely or never leave the mountain ranges. Thus *Chelidon urbica*, which is a rare visitant to the plains of India,* is represented by *C. Nipalensis* and *C. Cashmiriensis*; *Erythrosterna parva* and *E. leucura* by *E. maculata*, which is but rarely found in the plains, and by the various species of *Siphia*; *Pratincola Indica* by *P. ferrea*; *Ruticilla rufiventris* by *R. frontalis*, and others, *Calliope Kamtschatkensis* by *C. pectoralis*; *Motacilla personata* and *M. Luzoniensis* by *M. Hodgsoni*; *Carpodacus erythrinus* by species of *Propasser*.

* I have shot it in Chhatisgarh in the Central Provinces in April. Tickell, J. A. S. B. 1855, p. 277, records it from Chota Nágpúr and Moulmain; Captain Irby from Oudh; Blyth, Ibis, 1867, p. 338.

Almost the only migrant which we found in Sikkim commonly, before the cold weather birds appeared from the north, was *Phylloscopus lugubris*, and in the sub-family to which this belongs *P. tristis*, *P. fuscatus*, *P. viridanus*, and, perhaps one or two species of *Reguloides* breed, so far as is known, in Central or Northern Asia, and visit India in the cold weather, whilst *Phylloscopus fuliginiventer*, *Reguloides erochroa* and several species of *Abrornis* are peculiar to the Himalayas.*

It should be remembered that the collections made by Captain Elwes and myself were procured under great disadvantages. For the greater portion of the time, on the Cholá range especially, the weather was most unfavourable. Every field ornithologist knows how in wet and misty weather birds are silent and skulk amongst the bushes where it is most difficult to see them, whilst in bright sunshine they are constantly in the open. It is probable that any one visiting the highlands of Sikkim at a more favourable season, such as May, or October and November, would find very much to add to our observations.

I much regret having been unable, from want of time, to give any notes on invertebrata. My collections, however, were very small.

MAMMALIA.

QUADRUMANA.

PRESBYTIS SCHISTACEUS, Hodgs.

Jerdon, in the 'Mammals of India,' says that this monkey has not, to his knowledge, been obtained in Sikkim. Hooker mentions large monkeys near Lámteng† and again on his road from Láchúng‡ to the Tankra pass, in both cases in pine woods. I saw none myself, but several were shot by a shikari of Captain Elwes near Láchúng, thus rendering it nearly certain that it was this species which was noticed by Hooker, for no other large monkey is likely to be found at an elevation of 9,000 and 10,000 feet.

I greatly doubt if the Langúrs mentioned by Jerdon as occurring near Pankabari belonged to this species, because it is extremely improbable that an animal found at considerable elevations in the Western Himalaya, should also occur amongst the purely Malay forms of the Sikkim Terai. *P. schistaceus* has never to the best of my knowledge been found on the outer hills of Sikkim, the fauna of which is Malay, and it is perfectly natural to

* More Indian birds appear to breed in the Western Himalayas, but even here many cross the principal snowy range. I cannot agree with Lord Walden's opinion in this matter, (Ibis, 1867, p. 214 note), but much has been added to our knowledge of the summer haunts of the Indian *Passerines* during the last two or three years. Comp. Stoliczka, J. A. B. S., 1868. Tristram, Ibis, 1871, p. 109, &c., &c.

† Himalayan Journals Vol. II., p. 37.

‡ Ibid, Vol. II., p. 108, all references are to the first or octavo Edition, 1854.

find it in the pine forests of Northern Sikkim together with other forms of the Western Himalayas.

The following are the measurements of a fine adult female, taken on the body :—

	Feet	*Inches.*
Length of head and body measured in a straight line,	2	4
Ditto ditto, from nose to insertion of tail measured along the curve of the back,	2	6
Ditto of tail,	3	0
Ditto of fore leg,	1	7
Ditto of radius,	0	8½
Ditto of hand,	0	5¾
Ditto of hind leg,	1	8
Ditto of tibia,	0	8¼
Ditto of foot from heel,	0	8
Girth of neck,	1	0
Ditto of chest behind shoulders,	2	0
Ditto of head,	1	3

CHEIROPTERA.

Vespertilio Blanfordi, Dobson, Proc. As. Soc. Bengal, 1871, p. 214.

Two specimens of a bat which I obtained at Láchúng (8,000 ft.) are, Mr. Dobson informs me, identical with a species he had received from the North-west Himalayas, from both Simla and Dalhousie, and which he described under the above name.

A rather larger bat was noticed at the same place, but no specimens were obtained.

CARNIVORA.

Ursus Tibetanus ? F. Cuv. I presume this was the species common in the upper Tísta valley. I did not see any, although their tracks on the hill sides with marks of scratchings for roots and insects abounded. I noticed no tracks above about 12,000 feet. Bears are said by the people to be very destructive to the grain crops. I could not learn whether *Ursus isabellinus* is found in Sikkim or not.

Ailurus fulgens, F. Cuv., *A. ochraceus*, Hodgs. We heard of the occurrence of this animal in the pine woods around Láchúng, but neither of us saw it. Hooker was more fortunate (Him. Jour. Vol. II, p. 108). It is not common.

Canis (*Vulpes*) montanus, Pears., (v. *V. flavescens*, Hodgs.). Elwes picked up a perfectly fresh brush of a fox close to the Kangra Lama pass. It had a fine white tip. It is difficult to tell what animal could have killed the fox ; for we saw no large birds of prey except Læmmergeyers which I am disposed, with Mr. Hume and others, to consider carrion-feeders ; and the only large carnivorous mammal likely to occur at this elevation is the ounce.

5

RODENTIA.

ARCTOMYS.

Marmot holes were abundant around Momay, but I never caught sight of one of the animals.

I was singularly unsuccessful in procuring specimens of small rodents; on several occasions I saw a rat-like animal with a short head, probably *Neodon Sikkimensis*, but I could never capture a specimen.

? ARVICOLA sp. In the stream at Momay Samdong, on one occasion I saw a "water rat." This also may possibly have been *Neodon*, as that animal is said to be found at this elevation (15,000 feet), but it is not known to haunt streams. The animal I saw was swimming some distance beneath the surface, so much so that at the first glance I took it for a fish, but it soon came up and I could distinguish its form. It is scarcely necessary to say that my gun happened to be at an unusual distance, and not available. The water coming down from the Kinchinjhao glacier is icy cold, and it would be surprising to find a forest denizen like *Neodon Sikkimensis* in a glacier stream traversing a treeless region. I think it most probable that the animal I saw was either *Arvicola amphibia*, which is known to occur in Siberia, or some allied form, perhaps undescribed. It was certainly a much larger animal than Hodgson's *Mus hydrophilus*, which appears, moreover, to be a tropical or sub-tropical form.

The absence of squirrels in the pine woods of Northern Sikkim is very remarkable.

? LEPUS TIBETANUS, Waterhouse, P. Z. S., 1841, p. 7, and Nat. Hist. Mam. Vol. II, p. 58.

L. oiostolus, Hodgs. J. A. S. B., Vol. IX, p. 1186. Hooker, Him. Journal Vol. II, p. 158.

Hooker mentions the occurrence of slate-coloured hares with white rumps around Cholamú lake. I turned up two in one day in the Láchen valley near Kongra Láma pass, one of them about five miles on the Sikkim side of the frontier, so that if the Indian fauna is to be limited by the frontier of Tibet, this animal must be included in it. I doubt myself whether any of these Tibetan forms ought to be comprised in the Himalayan fauna; even *Ovis Nahura* is only a Tibetan form which strays into the higher ranges across the frontier.

Until more specimens can be procured and examined, it is impossible to say how far the various Central and Northern Asiatic races of hares, belonging to the type of the European *Lepus variabilis*, should be distinguished. There are—*L. variabilis*, Pall., identical with the European species found throughout Siberia; *L. tolai*, Pall., peculiar to the high steppes of Mongolia

and Central Asia; *L. hybridus*, Pall.,* Altai mountains; *L. Tibetanus* Waterhouse, described from specimens from Little Tibet; *L. oiostolus*, Hodgs., from the snowy region of the Himalaya; and *L. pallipes*, Hodgs., from Central and Eastern Tibet. Although Hodgson's *L. oiostolus* is considered by Waterhouse as probably the same as his *Tibetanus*, and this view has been accepted by Gray, Blyth and Jerdon, it should be borne in mind that the opinion is founded on very imperfect materials, and that Waterhouse himself was by no means certain of the identification.

LAGOMYS ROYLEI, Ogilby. Jerdon. Mam. Ind. No. 210.

L. nipalensis, Hodgs.—*L. Hodgsonii*, Blyth.

L. Curzoniæ, Hodgs., J. A. S. B., 1857, p. 207, nec Stoliczka, J. A. S. B, 1865, pt. II, p. 108.

? *L. badius*, Hooker, Himalayan Journals, Vol. II, p. 156.

Gúmchen, Bútia.

I feel some surprise at Hooker having overlooked the occurrence of this tail-less hare in Sikkim. That he did so is, I think, evident, because he especially refers (Vol. II, p. 156,) to the abundance of a *Lagomys* (which he calls *L. badius*) in the Tibetan portion of the Láchen valley, whilst at p. 132, he distinctly states that this animal, like the wild horse, fox and hare, does not cross the Donkia pass.

I first saw a *Lagomys* at about 12,000 feet on the Cholá range near the Jelep-lá; it abounded in the pine forests below Chumanáko at the foot of the Cholá, and I found the same kind again common in the pine forests, about Yeomatang, at 12,000 to 13,000 feet, in the Láchúng valley, and at similar elevation in the Láchen. I observed none above the limit of trees.

It is of course quite possible that the species seen by Hooker in the Tibetan part of the Láchen valley, at 16,000 to 17,000 feet, is a different species from that which inhabits the Sikkim pine forests. The name given by Hooker, *L. badius*, is probably one of Hodgson's numerous unpublished terms, and it is difficult to say, whether it was intended for the species subsequently named by him *L. Curzoniæ* or not.

I shall first describe the Sikkim *Lagomys*, and then proceed to the difficult question of nomenclature.

The Sikkim *Lagomys* is a small species, the largest specimen obtained being barely seven inches long. The fur above is rufescent brown externally, more rufescent and paler on the head and shoulders, mixed with black towards the middle of the back and the rump, in consequence of the hairs having longer black tips on those parts. All the hairs are blackish leaden

* Gray in Ann. and Mag. N. H., Sept. 1867, p. 223, gives *L. altaicus*, Brandt, as distinct from *L. hybridus*, but without any reference to a description. *L. altaicus*, Eversman, is *L. hybridus*, *teste* Waterhouse and Gray.

grey near the skin and for the greater part, fully two-thirds of their length; some have much thicker terminations of pale brown tipped with black on the back. The longest hairs on the back are about three-fourths of an inch in length. The sides are the same colour as the back, the breast is brown; muzzle, chin and belly whitish or isabelline, the latter being browner in the middle than towards the sides, but more conspicuously so in some specimens than in others. Hair on the belly about one-third of an inch in length. The feet are pale isabelline above, pinkish brown beneath; ears oval, thinly haired outside, except near the margin, where they are covered with very short close rich brown hair, the edge itself being whitish.

Mr. Hodgson, in his description of *Lagomys Curzoniæ*, says the fur is of two sorts, woolly and hairy. I believe the fur is the same in all species of *Lagomys*, and it is only so far of two sorts that some hairs have thickened tips.* Under the microscope all the hairs are the same towards the base, and appear to be cylindrical and colourless, with opaque granules at short and nearly regular intervals. A small portion only of the hairs are larger and have thickened tips which are not circular, but triangular, or quadrangular, apparently with three or four rounded longitudinal grooves. All the under fur is beautifully soft, but the terminations are harsher.

The following are the dimensions of two apparently adult specimens, taken from the bodies just after death. I unfortunately have not noted the sexes, but there is very little if any difference between them in measurements:—

	Inches.	*Inches.*
Length from nose to rump,	6·5	6·5
Nose to between ears,	1·5	0
Ear to nose,	0	1·5
Eye to nose,	0	0·7
Length of ear (measured behind the ear.)	0·7	0·8
Breadth of do.	0	0·6
Hind foot from heel with claws,	1·1	1·2
Tibia,	0	1·4
Fore foot and claws,	0·7	0·7
Radius,	0	1·0
Longest whiskers,	1·7	0

In a young specimen 4·5 in. long, the hind foot from the heel measured 0·9, the fore foot 0·5, the ear 0·5. The intestines in a specimen nearly 9 inches long measured 50 inches, and the cæcum 8 inches.†

* I find this is noticed by Ogilby in the description of *Lagomys Roylei*, Royle's Illust. Bot., &c., p. lxix.

† This appears so much that I thought there must be a mistake in my note, but on measuring the intestines of a young specimen about 4 inches long in spirit, I find they are 38 inches long, and all membranes contract greatly in spirit.

I have extracted the skull of an adult in spirit, proved to be full grown by the teeth and by the epiphyses of the limb bones being firmly united to the shafts by ossification. This skull measured only 1·45″ in length and 0·7 in breadth across the zygomatic arches; the orbits are very small, the longitudinal diameter being 0·35″, and the transverse 0·28 inches only. The nasal bones are of equal breadth above throughout, and the anterior palatine openings broadly confluent behind. This skull agrees very well with the figure in Royle's illustrations of the Botany, &c. of the Himalayas,* except that it is smaller and that the orbits appear rather shorter; the general form is strikingly similar. The description of the skin of *L. Roylei* both by Ogilby and Waterhouse (*Rodentia*, p. 26,) agrees well with the Sikkim animal, except that the variety from the western Himalayas appears to be of somewhat larger size, but as all the dimensions appear to be taken from skins, they are of small value, and Jerdon's measurements, which are probably from fresh specimens, exceed mine by very little. The specimens in the Indian Museum also agree with those from Sikkim, except that the fur is much harsher, but it is difficult to say how far this is the result of preparation and of exposure. I am inclined to attach less value to it, because the different specimens in the Museum vary greatly in the softness of the fur.

But I am also persuaded that the Sikkim species must be Hodgson's *Lagomys Curzoniæ.* The description agrees very fairly, and the dimensions† only slightly exceed those of my specimens, whilst they agree with Jerdon's dimensions of *L. Roylei.* It is true that Hodgson does not mention the black tips to the hairs, but as he uses the somewhat indefinite expression "murine fulvous" for the colour, I can only suppose that there were probably dark tips. Hodgson's specimens were said to come from the Chúmbi valley. Now I found *Lagomys Roylei* along the west slope of the range separating Sikkim from Chúmbi, in climates as different, and places as far apart as Cholá and the upper Láchúng valley, and it is very surprising, if a different species inhabits the other side of the range.

My friend Dr. Stoliczka has described a very distinct species‡ from Ladak as *Lagomys Curzoniæ*, J. A. S. B., Pt. II, pp. 108-111. I believe that this

* The type of Ogilby's *L. Roylei*, but named *L. alpinus* in the plate; comp. Royle's Illust. p. lxix. The coloration of the animal in this plate is very incorrect.

† The length of the palma and nails one-eighth inch must be a misprint, and it is evident that all the measurements have been taken from a skin, so that they are approximations.

‡ [I do not think that there is sufficient evidence for this statement. On comparing Hodgson's description of *L. Nipalensis* with that of *Curzoniæ*, the differences between the two can be noticed with little difficulty. The size of *Curzoniæ* varies greatly, many specimens equalling *Nipalensis* in size, but the fur is very distinct. Hodgson's description of *Curzoniæ* appears to me rather to apply to the species which I have re-described under the same name, than to *Roylei*.—F. Stoliczka].

is a distinct and undescribed species. Adults are very much larger than Hodgson's original specimens, being nine inches and upward in length, rivalling or exceeding *L. rufescens* in size, and the prevailing colour is isabelline. This species which has been excellently described by Dr. Stoliczka, l. cit., is easily distinguished from *L. rufescens*, by its longer and softer fur.

It may be objected that Hodgson having already described *Lagomys Roylei* under the name of *L. Nipalensis*, must have had a distinct species before him when he described *L. Curzoniæ*. But *L. Nipalensis* is of a very different colour from the typical *L. Roylei*, being, as described by Hodgson, deep bay from the snout to mid body. It was so distinct in appearance that Blyth described the young of *L. Roylei* as *L. Hodgsonii*, immediately after Hodgson had described and figured *L. Nipalensis*, and the latter species is kept distinct from *L. Roylei* by Waterhouse (Rod. pp. 24, 26,) and by Dr. Gray* Ann. and Mag. Nat. Hist. Sept. 1867, p. 220. I am myself inclined to believe that Mr. Blyth was quite right in uniting *L. Nipalensis* with *L. Roylei*, because the structural differences pointed out by Waterhouse appear scarcely of sufficient importance to prove the animals distinct, whilst the presence or absence of rufous coloration in mammals is not usually of much importance. But at the same time there do appear to be some slight differences between the forms inhabiting the Himalayas, and the divergence is greatest between the Nipal and the Sikkim races, a far greater difference existing than between other forms which Mr. Hodgson, who held extreme ideas on the subject, described as distinct species. The materials before me are insufficient to justify an accurate judgment in this matter, but they indicate the possibility of the three races being distinguishable in this manner.

Lagomys Roylei, verus. Six to eight inches; fur less soft, brown with a greyish tinge.

Do. var. Nipalensis. Length seven to eight inches, fur chesnut or bay above.

Do. var. Curzoniæ. Length six to seven inches, fur mouse brown, very soft.

At the same time the differences are so small that a good series of specimens would probably show a complete passage from one to the other.

Even if the *Lagomys* seen by Hooker north of the Sikkim frontier were different from the Sikkim species, the name applied to it by him *L. badius*, implies a very different coloration from that of Dr. Stoliczka's *L. Curzoniæ*.

* Dr. Gray also keeps *L. Hodgsonii* distinct, though it is considered by Waterhouse identical with *L. Nipalensis*, and both were united to *Roylei* by Mr. Blyth himself in his Catalogue of the Mammalia in the Asiatic Society's Museum, p. 133.

RUMINANTIA.

CERVUS AFFINIS, Hodgs. Jerdon, Mam. Ind. No. 218, p. 251.—Blyth, Cat. Mam. Mus. As. Soc. No. 480.—Blyth, J. A. S. B., Vol. xxx, 1861, p. 188.

C. Wallichii, Cuv. apud Blyth, J. A. S. B., Vol. xxiii, p. 736.—Hooker, Him. Jour., Vol. II, p. 214, (wood-cut of horns).

This animal must be expunged from the list of mammals found in Sikkim and, consequently, has no right to appear in Jerdon's Mammalia. After much enquiry in the country, I am satisfied that it is not found in Sikkim at all, nor yet in that portion of the Chúmbi valley which is near the Sikkim frontier. I could not hear of its occurrence in the country north of Sikkim, and I am inclined to believe that its range is entirely eastern.

This opinion, at which I had arrived quite independently, (for I had not looked at the paper in J. A. S. B., 1851, Vol. xx, p. 388, until after writing it) entirely confirms Mr. Hodgson's account of the animal's range. I think Dr. Jerdon must have overlooked this paper, or he would scarcely have given the animal so inappropriate an English name as the Sikkim Stag. Captain Elwes was especially desirous of obtaining a pair of the horns, and enquired about them from the people who came to meet us with the Sikkim Rája. All declared that this Stag is only found at a considerable distance beyond Chúmbi. Mr. Hodgson, l. c. p. 392, learned that it only occurs as a straggler in the Chúmbi valley, that it is unknown in Northern Bútan, and that the region inhabited by it is entirely Tibetan.

MOSCHUS MOSCHIFERUS, L.—Jerdon, Mam. Ind. No. 224, p. 266.—Hooker, Him. Jour., Vol. I. p. 269.

The musk deer occurs, but is not common on the Chola range; it is found much more frequently in the upper Láchen and Láchúng valleys.

PROCAPRA PICTICAUDATA, (Hodgs.). Blyth, Cat. Mam. No. 534, p. 173. Hooker, Him. Jour., p. 157, and wood-cut, p. 139.

Hooker records l. c. his having seen both this animal and the Chiru (*Kemas Hodgsonii*) at Lake Cholamú. I did not hear of it in Sikkim, nor has it, so far as I am aware, been met with. The Súbá of Kambajong, as mentioned in the first part of these notes, brought a fresh skin to Kangra Lama.

KEMAS HODGSONII, (Abel). Blyth, Cat. Mam. No. 535, p. 173.

Antilope Hodgsonii, Hooker, Him. Jour., Vol. ii, pp. 132, 156, and wood-cut, p. 157.

Hooker found the horns of the Chirú near Momay Samdong in the Láchúng valley, and saw the animal at Cholamú Lake. The Tibetans assured us that it is not now found within a long distance of the frontier, and appeared greatly surprised when we told them it had been seen by Hooker. It

may occur near Cholamú only at particular seasons, but it is not probable that Hooker was mistaken about so fine and conspicuous an animal.

NEMORHŒDUS BUBALINUS, Hodgs. Jerdon, Mam. Ind. No. 230, p. 283. *Gya*, Bútia. *Sichi*, Lepcha.

The Serow is not rare in Sikkim, but like all other mammals, it shuns the leech-infested belt between 5,000 and 10,000 feet during the rainy season, at which period it is said in the outer hills to descend into the deep valleys. I frequently saw the tracks of this goat-antilope in the forests around Láchúng which are out of the leech region at 8,000 to 10,000 feet. It does not ascend to any great elevation.

N. GORAL, Hardwicke. Jerdon, Mam. Ind. No. 231, p. 285. "Ragen" Hooker, Him. Jour. Vol. ii, p. 98.

The goral is common on the grassy and rocky cliffs west of the Láchúng valley from Chúngtám to Láchúng, and is also found in the Láchen valley. At the period of my visit all were between 8,000 and 10,000 feet, but in winter they are said to descend much lower. I could not hear of any being found on the Chola range, and I suspect the animal is only to be met with in the interior of Sikkim. I saw goral several times near Láchúng. It keeps to rocky cliffs and grassy slopes, and does not appear to inhabit forest.

HEMITRAGUS JEMLAICUS, H. Smith.—Jerdon, Mam. Ind. No. 232 p. 286.

I have been assured that the Tehr is found in Sikkim, but I did not see it, nor has any one else whom I know. It is said to inhabit the forests high up on the sides of the Tísta valley near Chúngtám. As it is well-known to be a native of Nípal, its occurrence in Sikkim is highly probable.

An animal was described to us by the Tibetans as inhabiting parts of Tibet north of Jigatzi, which was probably the Himalayan Ibex, *Capra Sibirica.*

OVIS NAHURA, Hodgs. Jerdon, Mam. Ind. No. 237, p. 296.—*Ovis Ammon,* Hooker, Him. Jour. Vol. ii, p. 132, wood-cut, p. 140. *Náo* or *Gnáo*, Tibetan.

OVIS AMMON, L. Hooker, Him. Jour. Vol. i, (? p. 243), wood-cut, p. 249, *Nyeng*, Tibetan.

The burhel is not known to occur on the Chola range to the southward, but it is found near the Tankra pass, and scattered over the grassy hills in the higher valleys of the Láchen and Láchúng. In September and October I never saw any below 14,000 feet.

The burhel is undoubtedly the wild-sheep to which Hooker refers under the name of *Ovis Ammon*, and of which he speaks as being seen occasionally near Momay Samdong. That such is the case is proved by the name he applies to it "gnow." I cannot help thinking it highly probable that he

only saw burhel also in the Yangma valley, in East Nípal. A herd of rams of *O. nahura*, although inferior in size to the true *Ovis Ammon*, would certainly strike any one seeing them for the first time by their proportions, but it is possible that the sheep seen on this occasion may have been the larger kind. So far as Sikkim is concerned, however, every enquiry made by us elicited the assurance that the true *Ovis Ammon*, or *Nyeng*, never occurs south of the Donkia and Kongra Lama passes, though frequently met with at a short distance to the north in Tibet; so that in this respect, at all events, Jerdon is perfectly correct in excluding it from his Mammals of India, p. 298, as not found on the Indian side of the Himalaya.

AVES.

Order Raptores.

Vulturidæ.

A large vulture was occasionally seen, but not sufficiently near to enable either Captain Elwes or myself to ascertain the species or even the genus. Probably it was *Gyps Himalayensis*, Hume, Scrap Book, Part I, p. 12, which has now been determined by Mr. Gurney to be a good species and distinct from *G. fulvus*, Gm., to which the Himalayan bird was assigned by Dr. Jerdon.

Falconidæ.

7* Gypaetus barbatus, (L.)—The Læmmergeyer has not previously been recorded from the Himalayas east of Nipál. I did not meet with it on the Cholá range, nor within the limit of forest in northern Sikkim. It is, however, common in the upper Láchen and Láchúng valleys above 14,000 feet. Neither of us succeeded in obtaining a specimen, although several of the birds passed at no great distance. They looked small both to me and to Captain Elwes, and I hope that specimens will hereafter be obtained for comparison. I should not have mentioned the apparent size, but that the only Læmmergeyers I have ever seen alive are the small *G. meridionalis*, Keys. and Blas., of Abyssinia.

17 Tinnunculus alaudarius, (Gm.).

24 Accipiter nisus (L.).—Both the Kestril and Sparrow-hawk were common in the upper Láchen and Láchúng valleys after the middle of September, evidently migrating southwards. None were seen on the Chola range at the end of August. The kestril was seen a few days sooner than the sparrow-hawk.

47 Buteo plumipes, Hodgs.

A single example of this rare buzzard was shot by a shikari at an elevation of about 13,000 feet near Yeomatang in the Láchúng valley. It proved to be, as ascertained by dissection, a female in fine plumage. It agrees

* The numbers are those of Jerdon's Birds of India.

excellently with Hodgson's original description. The following is a full account.

Plumage throughout, above and below, dark umber brown, a little darker, if anything, below than above, slightly paler on the rump, faintly glossed above with purple except on the head. Shafts of the body feathers black. Lores covered in front with white feathers, behind with radiating black hairs. About the nape there are some faint rufous edgings to the feathers; a few white spots appear on the scapularies, only to be detected by turning back the upper feathers. Primary quills very dark for a considerable length near the tip, paler, with transverse white or whitish bars near the base, shafts white at the base, becoming black at the tip only. Secondaries a little paler than the primaries and with white or whitish bars. Under-wing coverts umber. Tail feathers dark umber, rather indistinctly barred with pale umber, above pale with white hairs beneath, the bars becoming obsolete towards the base, about one and a half inches at the tip of each feather unbarred, extreme tip pale.

Iris pale brown; bill black towards the tip, pale towards the base; cere, gape and legs yellow, claws black. The first four primaries deeply emarginate on the inner webs, the 2nd, 3rd, 4th, and 5th, but not the first, on the outer.

The principal dimensions were taken on the fresh carcase, only those of the beak, tarsi and toes are from the skin. Length 20 inches, wing 16, tail 9·25, tarsus 2·9 feathered in front for 1·5, mid toe without claw 1·5, its claw measured round curve 0.9, outer toe 1, its claw 0.65, inner toe 0·95, its claw 1·15, hinder toe 0·8, its claw 1·15, bill straight from end of cere 0·88, round curve 1, from gape 1·47. The 4th primary is the longest, the 3rd shorter by 0·2 in one wing, 0·35 in the other, 2nd by 1·6, 1st by 4·75 in one wing, 4·4 in the other. The closed wings reached to within one inch of the end of the tail.

The tarsi have 9 or 10 broad scutes behind for the lower half of their length, above this are hexagonal scales. In front are hexagonal scales only, a little larger than those at the sides above, but becoming small near the feet.

The discovery of a second specimen of this buzzard, coinciding in coloration with that first obtained by Mr. Hodgson, renders it far more probable that this is really a good species, and not a mere accidental phase of plumage of some other.

Of the Indian species to which it might be referred, *Buteo ferox* (*B. canescens*, Hodgs.) is out of the question, being much larger. *B. desertorum* (*B. rufiventer*, Jerdon), which comes nearest in size, is distinguished by its rufous colouring, especially on the underparts, of which there is not a trace in *B. plumipes*. *B. vulgaris*, which is now excluded from the Indian fauna, does not appear to assume so uniform a plumage. Moreover, on comparing

the Sikkim specimen with the series in the Indian Museum, I found that in no case have any of the three species named small hexagonal scales in front of the tarsi as in *B. plumipes.** There is some variation in this character, but all differ widely from my specimen. Both *B. vulgaris* and *B. desertorum* also appear to have shorter toes.

Mr. Blyth (Ibis, 1866, p. 245) considers *B. japonicus*, Schl., (Fauna Japonica, Av., t. vi. and vii.) probably identical. This is of less importance at the present moment, because Mr. Hodgson's name has priority, but disregarding the question of plumage, the scutes on the tarsus of *B. japonicus* are said to be broader, but less high than in *B. vulgaris*, and there are about 8 in front and 12 to 15 behind. The dimensions are a little smaller than those of *B. plumipes*, wing 13½ inches (french, = 14·4 english) in the adult female. The only conclusion at which I can arrive is that *B. plumipes* is a good species, and that *B. japonicus* is probably distinct.†

56 Milvus Govinda, Sykes.—The only kite I have brought from the upper Láchúng valley, shot at 8,000 feet, belongs to the common Indian race, but a specimen from Tamlúng and another from Darjiling are of the large *M. melanotis*, Tem. and Sch., *M. major* of Hume. Kites, *M. Govinda,* I believe, were seen up to about 12,000 feet.

The paucity of Raptorial birds in Upper Sikkim is most striking. I did not notice a single true falcon or eagle ; and kites, kestrils, sparrow-hawks, and Læmmergeyers are the only kinds at all frequently seen.

Order—Insessores.—Sub-order—Picariæ.

Picidæ.

161 Picus hyperythrus, Vig.—This is the only woodpecker which I saw in the pine forests of upper Sikkim. Even this is rare ; only two specimens were obtained during our stay, one at about 10,000 feet in the Láchúng valley, the other at about 9,000 in the Láchen. The latter is a young bird, and has dusky bars on the breast. The change from the fauna of outer Sikkim, where woodpeckers abound as they do throughout Malayasia, is strikingly exemplified by this family. It is doubtful, if *P. hyperythrus* has been obtained in the neighbourhood of Darjiling ; specimens reported to have been brought thence were probaby shot in the interior.

* Mr. Hodgson's original specimen of *B. plumipes*, however, is described, P. Z. S., 1845, p. 37, as having the tarsus scutillate before and behind.

† Since writing the above, I have seen Dr. Jerdon's remarks on this species in the July number of the Ibis, p. 340. He also considers the species distinct, but says the toes are peculiarly short. I trust to be able hereafter to compare my specimen in Europe.

Cypselidæ.

103 Collocalia fuciphaga (Thunb.).

Common on the Cholá range up to at least 12,000 feet, and throughout the Tísta valley at low elevations. I did not meet with any swift in Upper Sikkim.

Upupidæ.

254 Upupa Epops, L.—Not rare at high elevations in Northern Sikkim. I saw it as high as 15,000 feet at Momay Samdong. Very probably all seen were migrating from beyond the Himalayas, as it is scarcely probable that any breed at this elevation.

Sub-order—Passeres.

Nectarinidæ.

629 Æthopyga ignicauda (Hodgs.).—Common in rhododendron and pine jungle at about 11,000 feet on the Cholá range in August, feeding upon flowers in open glades. All seen were young males in non-breeding plumage, or females.

I have no specimen, but I believe the identification of this bird is correct. Several were shot by Captain Elwes. No *Nectarinidæ* were seen in Upper Sikkim.

Ampelidæ.

629 Myzornis pyrrhoura, Hodgs.—Common in the same place as the last species, hunting amongst the brushwood and over the mossy banks. I shot one on the ground. It was evidently hunting about the moss for insects. Mr. W. S. Atkinson obtained specimens on the Singalelá range. None were seen in Upper Sikkim.

In Mr. G. R. Gray's new Hand list of birds *Myzornis* is placed as a subgenus of *Yuhina*, between *Phyllornis* and *Criniger* in the *Phyllornithinæ;* a view not borne out by the structure of the birds, nor by their nidification, so far as that is known. I doubt its being an improvement on Jerdon's classification.

627 Yuhina occipitalis, Hodgs.—This bird, which Dr. Jerdon says is rare near Darjiling, is very common and abundant in the pine forests between 8,000 and 10,000 feet in the Láchen and Láchúng valleys. It is found in small flocks usually associated with other species. The following measurements were taken on a freshly killed bird; length 5, wing 2·4, tail 2, tarsus 0·7, bill 0·55 inches.

626 Y. gularis, Hodgs.—This is less common than the last in the pine forests about Láchúng, though still by no means rare. It is common above 10,000 feet on the Cholá range, where I did not meet with *Y. occipitalis.*

623 Ixulus flavicollis, Hodgs.—I obtained two specimens near Lamteng in the Láchen valley at about 9,000 feet, which seem rather smaller than Darjiling specimens, as appears by the following comparison :—

	Wing.	*Tail.*	*Bill from gape.*	*Tarsus.*
Specimens from Láchen valley, ...	2·25	1·8	0·5	0·72 & 0·78
„ from Darjiling (1,)	2·52	2·	0·62	0·8
„ „ (2,)	2·65	1·88	0·56	0·75

622 Proparus vinipectus, Hodgs.—This species does not appear to have been noticed from Sikkim before ; at least I can find no mention of its occurrence so far east. I obtained two specimens, one from pine forests in the Láchen valley at about 11,000 feet, the other on Sinchal, close to Darjiling. The measurements rather exceed those given by Jerdon.

	Length.	*Wing.*	*Tail.*	*Bill from forehead.*	*Tarsus.*
1.—Láchen valley, ...	5	2·25	1·9	0.3	0.9
2.—Sinchal, ...	5	2.35	2·0	0·32	0·95

Iris yellow with a reddish tinge, bill dusky above, livid below, legs livid. The head is not crested.

621 P. chrysæus, Hodgs.—*P. chrysotis*, Blyth, and G. R. Gray. I obtained a single specimen in the Láchen valley at about 9,000 feet. Captain Elwes shot two or three in the same valley at a somewhat lower elevation. In my specimen, a male, the measurements are—wing 2·15, tail 1·8, bill from forehead 0·32, tarsus 0·88 inches.

The name *chrysotis* is evidently inappropriate, and so clearly due either to a misprint or an error in a label that although first published, I think Jerdon quite right in using Hodgson's name for this bird. Surely the law of priority does not extend to misprints.

618 Minla igneotincta, Hodgs.—Common in both the Láchen and Láchúng valleys up to about 9,000 feet, but not higher, in company with *Yuhinæ*, tits, and other birds.

616 Siva strigula, Hodgs.—I met with this bird at about 10,000 feet on the Cholá range, and again in the Láchúng valley at about 9,000. In the latter locality it appeared not to be very common. The only specimen preserved has the orange of the head confined to the forehead, the crown being rufous olive. As the colours of the lower parts also are duller, this is probably a female ; *comp.* Stoliczka in J. A. S. B., 1868, Pt. ii, p. 50.

Allotrius xanthochlorus, Hodgs.—I obtained one specimen at 9,000 feet in the Láchen valley. It was in a mixed flock of small Sylviads ; (*Philloscopi*, &c.), *Ægithalisci*, and *Yuhinæ*. I have since received another specimen from Darjiling, probably a male. My specimen from the Láchen valley is a female, and agrees well with Dr. Stoliczka's description, J. A. S. B., Part ii, 1868, p. 50. The back is a rather yellower green than that of the (supposed) male, abdomen greenish yellow. Dimensions taken before

skinning—length 4·7, wing 2·4, tail 1·85, tarsus 0·75, bill from forehead 0·3, from gape 0·55 inches. Iris dark brown, bill black above, bluish grey below; legs purplish horny.

Crateropidæ.

376 HETEROMORPHA UNICOLOR, Hodgs.—This I only saw in one place in the Láchúng valley, between 7,000 and 8,000 feet of elevation. The birds were in flocks, skulking in dwarf bamboo jungle in the usual Crateropidine manner.

381 CONOSTOMA ŒMODIUM, Hodgs.—This also I met with but once. I came upon a flock making a great noise amongst dwarf bamboos at about 11,000 feet elevation on the Cholá range.

Perhaps neither of the last two birds should have been comprised, as neither was found above the lowest limit of pines.

417 TROCHALOPTERUM SUBUNICOLOR, Hodgs.—This appears to range much higher than its congener *T. chrysopterum.* I shot it at about 11,000 feet on the Cholá range, and about 9,000 in the Láchúng valley. Iris yellowish grey.

I cannot at all admit the justifiability of separating this species, *T. phœniceum* and *T. squamatum* from the other forms of *Trochalopterum*, as is done by Horsfield and Gray. To place these three forms in a distinct genus from *T. chrysopterum* and *T. affine* appear to me a violation of natural affinity. There is no difference in the shape of the wing to which any importance can be attached. As a rule the 6th primary is the longest in all, but both the 5th and 7th are so nearly the same length, that specimens may be found in which either of them slightly exceeds all the others. Then, as to the bills, *T. subunicolor* differs quite as much from *T. phœniceum*, as the latter does from *T. chrysopterum* or *T. affine.* The structure of the feet, general dimensions, the plumage, and habits are precisely similar in all, and I thoroughly agree with Dr. Jerdon in classing all together. If any of the group deserve separation, it appears to me that the forms from the Malabar hills *T. cacchinans*, *Jerdoni* and *Fairbanki*, are better entitled to distinction than those placed in Mr. Gray's genus *Pterocyclus*, a name long previously employed amongst the Mollusca, as has repeatedly been pointed out before.

419 T. AFFINE (Hodgs.).—This is the only Crateropidine which can be said to belong fairly to the fauna of sub-alpine Sikkim; it ranges much above all other forms, and Jerdon is quite right in his suggestion that it frequents the higher mountains. On the Cholá range it abounds at 11,000 to about 13,000 feet, in rhododendron scrub and on the skirts of the pine woods, and in Northern Sikkim I found it far from rare at the same elevation or a little lower. Its habits are precisely the same as those of *T. chrysopterum,* and other allied forms. Iris olive.

Hirundinidæ.

93 CHELIDON CASHMIRIENSIS, Gould.—Common on the Cholá range about the upper limit of forest, 12,000 to 13,000 feet. It was chiefly seen hunting over streams and lakes.

Laniidæ.

258 LANIUS TEPHRONOTUS (Vigors).—Common at Láchúng, 8,000 to 9,000 feet in the beginning of September, but three weeks later all had disappeared. Many of those seen were in young plumage with hair on the breast, back, and scapulars.

Campephagidæ.

274 PERICROCOTUS SOLARIS, Blyth.—I shot a female from amongst a flock at about 10,000 feet elevation near Láchúng.

There is evidently a misprint in Jerdon's description of the female of this bird. It is the back which is olive green, the lower parts are deep yellow passing into whitish on the throat. The rump is dark yellow with a slight brownish tinge.

The female of *P. solaris* is distinguished from that of *P. brevirostris* by its shorter bill, greyer head, ashy ear coverts, whitish throat, and especially by wanting the broad yellow forehead of the last named species, which I found abundant in the Tísta valley at elevations below about 6,000 feet.

Muscicapidæ.

296 HEMICHELIDON SIBERICA, (Gm.).—*H. fuliginosa*, Hodgs.

One young specimen obtained in the Láchen valley at about 9,000 feet.

294 CHELIDORHYNX HYPOXANTHA (Blyth).—Common in pine forests at the foot of the Cholá pass at about 12,000 feet elevation. In the interior I did not notice it above about 8,000 feet, below that it abounded. It was usually seen in small flocks, hunting about trees.

319 SIPHIA STROPHIATA, Hodgs.—The only fly-catcher commonly seen in the pine woods of the Láchúng and Láchen valleys. Here it was found up to an elevation of 12,000 feet, associating with tits, Sylviads, and *Ixuli.* It was also common on the Cholá range at the same elevation. The white on the rectrices decreases on the outer feathers, as noticed by Stoliczka in specimens from N. W. Himalayas. (J. A. S. B., 1868, Part ii, p. 32).

The plumage of the young bird does not appear to have been described; the following is that of a specimen shot at Yeomatong, in the upper Láchúng valley, on September 12th. Upper parts and sides of the head and neck brown, the feathers of the head with narrow brownish yellow streaks down the centre; these increase in size till, on the back, the feathers are brownish yellow with dusky brown margins; the same on the rump, but the colour is a little less brilliant. Quills and coverts dark brown, broadly edged with rufous brown,

the last secondaries (or tertiaries) being entirely rufous; tail as in the adult; throat and breast brownish yellow, the feathers with dusky edges, giving a scale like appearance; flanks duller; lower abdomen, vent, and under-tail coverts white.

CINCLIDÆ.

348 CINCLUS CASHMIRIENSIS? Gould.—Blyth has already mentioned the occurrence of this dipper in Sikkim, Ibis, 1866, p. 374. I found it far from rare in the upper parts of the Láchen and Láchúng valleys, at elevations exceeding 14000 feet.

The specimens vary much in plumage. The only two I have retained are smaller than the dimensions given by Jerdon and Salvin (Ibis, 1867, p. 117), and they do not exactly agree in coloration. In that which I look upon as adult, or near adult, the head and neck above and at the sides, and the upper part of the back are dull brown, a white spot above the eye, and another smaller one below, middle and lower back cinereous with dark brown margins, tail cinereous, quills and wing coverts brown, the outer webs cinereous, the secondaries and greater coverts with narrow white tips; throat and breast white, abdomen brown, the feathers with slight white edges, flanks and under tail coverts cinereous; bill black, tarsus (when alive) purplish grey, wing 3.4, tail 1·9, tarsus 1·1, bill from gape 0·9, from forehead 0·65 inches.

Another specimen, probably younger, has some grey mixed with the brown of the head feathers, and the centre of the abdomen, as far back as the thighs, white, not so pure as on the breast, the feathers being brownish below; there are traces of dusk margins to the breast feathers also; wing 3·6, tail 2,05, tarsus 1·13, bill from gape 0·9, from forehead 0.65 inches.

If these birds belong to *C. Cashmiriensis*, it is evidently a variable species.

347 C. ASIATICUS, Swains.—This ranges, in the summer, as high as 12,000 feet at least, and I have a specimen shot at that elevation at Yeomatong in the Láchúng valley. I saw brown birds which I noted at the time as belonging to this species up to 14000 feet, and I believe they were correctly identified, but as I secured none, they may have belonged to the next. Towards the end of October, I saw this dipper in the great Rangít river, not 1000 feet above the sea.

349 C. SORDIDUS, Gould.—A single dipper which I shot at about 15,000 feet on the Cháchú stream below Phálúng, close to the Kongra Lama pass, only differs from the description of this species by its rather larger size; it is a little darker in colour than Gould's figure in the Birds of Asia. I took it at the time for *C. asiaticus*, and was surprised at seeing that bird at so great an elevation, in a place where the fauna is distinctly Tibetan. There is a cinereous tinge on the outer margins of the quills on the upper coverts, which have dark margins, and on the tail. Wing 4 in., tail 2·3, tarsus

1·17, bill from forehead 0·68. Jerdon's measurement of the bill, ⅞, must be from the gape.

It is quite possible that this may be a distinct local race, inhabiting Eastern Tibet, but I scarcely like to separate it without better means of comparison.

TURDIDÆ.

350 ZOOTHERA MONTICOLA, Vigors.—I obtained one specimen at about 10,000 feet in the Lachen valley, but I did not shoot it myself.

362 MERULA ALBOCINCTA, (Royle).—This black bird is common in rhododendron scrub, and on the skirts of forest on the Chola range at 11,000 to 13,000 feet. I saw it also at Láchúng in Upper Sikkim at about 8,000 feet. It appears to haunt banks of streams.

352 OREOCŒTES ERYTHROGASTER, (Vigors).—Obtained by Captain Elwes near Láchúng.

478 GRANDALA CŒLICOLOR, Hodgs.—The systematic position of this bird is very puzzling. I cannot see much affinity for *Myiomela*, and even less for *Calliope*, next to which Mr. G. R. Gray classes it in his 'Hand list.' I was wrong in placing the African *Pholidauges leucogaster*, in the same genus (Obs. Geol. and Zool. Abyssinia, p. 367), but I still believe that there is some affinity between the two. The bill of *Grandala* is certainly *Saxicoline*, but I am strongly disposed to doubt whether, as a rule, far too great importance is not attached to characters of the bill by ornithologists.

Were I to judge *Grandala* by its flight, habits, and form of wing, I should unhesitatingly place it amongst the Starlings. The tarsi are, it is true, less strongly scutellated than in the *Sturnidæ*, but still the scutellation towards the base is well marked, and the tarsus has no more resemblance to that of a *Saxicola* than to that of *Sturnus*. On the whole perhaps the most natural position is in the thrushes, some of which, as the fieldfare, assemble into flocks in the winter.

Captain Speke was quite correct as to the gregarious habits of this bird, Mr. Hodgson's information, however, may have been derived from its being found solitary or in pairs in the summer. We first met with it at Momay Samdong (15,000 feet). A flock entirely composed of young birds or females used to visit a small grassy flat, close to our encampment, for several evenings after our arrival, and hunt about for insects which were atracted by the yak's dung, exactly as starlings do. All which I shot proved to be young males. I saw none at a lower elevation, but near Donkia pass, at above 17,000 feet, I met with a flock in which were some males in adult plumage, one of which I shot.

483 PRATINCOLA INDICA, Blyth.—Common in the Láchúng and Láchen valleys in September and the beginning of October, and apparently

migrating. I doubt if this bird breeds on the mountains of Sikkim; none were observed on the Chóla range.

386 P. FERREA, Hodgs.—Seen in Northern Sikkim occasionally at about 7,000 to 9,000 feet, but less common than about Darjiling.

497 RUTICILLA RUFIVENTRIS (Vieil.). Not seen on the Chóla range, but abundant in the Láchen and Láchúng valleys during the latter parts of our stay in them. The first specimen was shot at Momay Samdong (15,000 feet) on September 21st. In this case there could be no question that the birds migrated from beyond the passes, because none were seen before the date mentioned, even in the highest parts of the valleys at 15,000 to 18000 feet, whilst afterwards they were abundant everywhere, and on our return in the middle of October we saw them at 4,000 feet in the Tísta valley. It is mentioned by Dr. Stoliczka as breeding in Western Tibet. It certainly, I should say, does not breed in Sikkim.

503 R. FRONTALIS (Vigors).—In contrast to the last species which abounds in the plains of India in winter, but crosses the snows to breed, this redstart, which rarely, if ever, visits the plains, but which Jerdon found abundantly around Darjiling in winter, evidently breeds in the higher hills of Sikkim. I met with it on the Chólá range and again abundantly in the Láchúng and Láchen valleys at from 12,000 to 14,000 feet, and at Yeomatong on September 12th and 14th I shot three birds in spotted plumage. These young birds have the upper parts dark brown with isabelline spots, quills and wing coverts hair brown, the secondaries and coverts with rufous edges, throat and breast feathers dirty white in the centre, with broad brown margins, the white centres pointed at the end, presenting a peculiar scale-like appearance. Abdomen dull rufous or isabelline with some brown edgings which, however, have disappeared in one specimen; tail precisely as in the adult. The outer tail feathers in all have the outer web, except near the base, black, as well as the tip.

I several times at high elevations, both on the Chola range and in Northern Sikkim, saw another species of *Ruticilla*, but I never succeeded in shooting a specimen, nor did my fellow traveller. It was perhaps *R. cæruleocephala*, (Vigors).

505 R. [RHYACORNIS] FULIGINOSA (Vigors). Jerdon's description of the habits of this bird, are, as usual, admirable. It is, however, found at a greater elevation than stated by him, and on the Cholá range I occasionally saw birds up to 11000 and 12000 feet, but at the same season I saw and shot others below 3000 feet elevation. In Northern Sikkim it did not, in September and October, range above 7000 feet. Mr. Blyth, in the Ibis for 1867, p. 16, refers to Dr. A. Leith Adam's second species allied to this, seen in Kashmir (P. Z. S. 1859, p. 179, No. 82 of the birds of Kashmir and Ladak). It is described as "smaller; colour a leaden ash, whith several *white* feathers in the tail." Surely the female is referred to.

I am quite of the same opinion as my friends Dr. Jerdon and Dr. Stoliczka (J. A. S. B. 1868, p. 43,) as to the difference between this species and other *Ruticillæ*, but I rather doubt whether it should be placed in *Chimarrhornis*, as proposed by Mr. Hodgson and Dr. Stoliczka. The bill undoubtedly shews some similarity in form, a modification probably connected with aquatic habits of both birds, and the tail is rounded as noticed by Jerdon, but the wings are *Ruticilline*, and the general characters of the plumage of both sexes — structural character which, viewed in the light of evolution by descent from common forms, I should be inclined to think of more importance than the slight modifications of the bill and tail,—dissociate *R. fuliginosa* altogether forms *Chimarrhornis*. It appears to me, as it did to Dr. Jerdon, to form the type of a distinct subgenus which might be called *Rhyacornis ;** and which appears to me to have as good claims to separation as *Adelura* and *Chimarrhornis*. The characters are :

Rhyacornis, *subg. nov.* Ruticillæ : *Rostrum brevius et latius quam Ruticillæ, cauda magis rotundata. Fæmina a mari valde diversa, et rectricibus exterioribus basin versus albis.*

499 *R.* (*Adelura*) ERYTHROGASTRA (Güld.)—Bill and plumage similar to *Chimarrhornis*, but the wings and tail are those of *Ruticilla*, and so are the habits to a great extent. I have seen this bird on the banks of streams and of lakes, but more frequently on rocky hill sides, and at times on the edges of glaciers. It was only met with at great elevations, never below 14000 feet, but in the highest parts of the Láchen and Láchúng valleys it was far from rare, and Captain Elwes shot it at Cholamú Lake. I saw no females, at least I only saw birds in the plumage of the male, and all the specimens shot by me were males.

The following measurements were taken on fresh specimens before skinning.

	Length.	Wing.	Tail.	Tarsus.	Bill from forehead.
1	7	4·4	3·2	1·1	0·45
2	7·3	4·2	3·	1·1	0·45

Iris brown, bill and legs black.

R. Vigorsii, Moore, quoted by Jerdon as the female of this species, is considered distinct by G. R. Gray (Hand-list, I, p. 221). It is certainly very different from the bird figured as the female or young male by Gould in the Birds of Asia, and as it differs from *R. erythrogaster* in having the central rectrices dark coloured, and in the absence of a wing spot, (both rather improbable sexual differences), it is probably a distinct species.

506 *R.* (*Chimarrhornis*) LEUCOCEPHALA (Vigors).—Common on streams and around the edges of lakes, at elevations above 12,000 feet on the Chola range

* From ρύαξ a stream and ὄρνις.

and above 10000 in Northern Sikkim in August, September and the beginning of October. It evidently breeds in the higher ranges, and descends in winter to the valleys, as described by Jerdon. In the middle of October all the birds of this species in the Láchen valley had descended to below 10,000 feet elevation.

508 Ianthia rufilata, (Hodgs.)—This is another bird found in the winter around Darjiling, which evidently breeds in the pine forests. I shot specimens at about 12000 feet both on the Cholá range and in the Láchúng valley. One bird, a female, killed in the last named locality, is immature and has only partially assumed the adult plumage. It has pale spots on some of the back and head feathers, whilst the nestling feathers remaining on the breast are isabelline with dark margins.

Drymochares stellatus.—Gould P. Z. S. 1868, pp. 218, 219. Birds of Asia, Pt. XXI. A single male was shot by my shikari at Yeomatong in the Láchúng valley at 12000 to 13000 feet. The specimen is in poor condition and much injured, so that I can give no trustworthy dimensions.

This form, although well distinguished by its peculiar coloration, appears to be scarcely entitled to rank higher than a sub-genus of *Brachypteryx.* I have elsewhere, in another paper on Sikkim birds, given my reasons for placing *Brachypteryx* near *Ianthia* in preference to classing it with the wrens, as is done by Jerdon. The usual position assigned to the genus amongst the *Timaliinæ* (*Crateropidæ*) or *Leiotrichinæ* appears to me quite incompatible with the structure and habits of the Himalayan species.

513 Calliope pectoralis, Gould.—Common on the Chola range, but less abundant in northern Sikkim; in both localities only seen, in August and September, above 12,000 feet, and usually above the limit of forest. It haunts rhododendron scrub in which it doubtless breeds, and is frequently seen on the hill side near bushes.

In the only male I possess there is no white moustachial stripe, and I can only find one male specimen out of 5 (4 mounted and 1 skin) in the Indian Museum, exhibiting this character. This specimen also has the white spots at the tip of the tail feathers much larger than in others. In my specimen, and in one apparently from the N. W. Himalayas, as presented by Jerdon to the Museum, there is a broad white forehead, not mentioned in Jerdon's description, and wanting on other specimens to which I have access.

The adult females (2 in number,) shot by me, do not agree well with Jerdon's description, which may perhaps be taken from a young male. At all events in 2 adult females, and 2 young birds obtained in Sikkim, as also in the skin of a hen bird in the Indian Museum, there is no white whatever at the base of the tail. Adult females have the upper parts brown with a slight greyish tinge, wings hair brown with paler margins to the quills; tail blackish, feathers tipped white (not fulvous), but without any white at the

base, supercilia dull white, sides of head greyish brown, sides of neck, breast and flanks ashy; chin and middle of throat white, abdomen white also, but less pure, lower tail coverts slightly fulvous, thigh coverts dark brown. A rather younger female has a browner back and flanks and indistinct supercilium.

The young birds agree with Dr. Stoliczka's description, (J. A. S. B. 1868, Part II, p. 45) except that my specimens, which are perhaps females, have no white at the base of the tail.

The measurements of my Sikkim specimen, except the tarsus and bill, are less than those given by Dr. Jerdon.

	Wing.	Tail.	Tarsus.	Bill from forehead.	Bill from gape.
Male,...	2·75	2·2	1·25	0·48	0·72
Female,......	2·7	2·05	1·22	0·48	0·7
Ditto,.........	2·82	2·2	1·23	0·52	0·75

514 CYANECULA SUECICA, (L.)—This was seen occasionally in the latter part of September, and more frequently in October, apparently coming from the north and migrating southwards. I shot one bird at Momay Samdong on the 19th September.

In Mr. G. R. Gray's 'Hand list,' the Indian blue-throat is still classed as *C. cæruleculа*, Pall., but Mr. Blyth, in the Ibis for 1867, p. 17, note, has shewn that it is identical with the Swedish form, the type of *Motacilla suecica* of Linnæus, and until Mr. Blyth has been proved to be in error on this point, the Indian race must bear the latter name.

Sylviadæ.

558 PHYLLOSCOPUS* LUGUBRIS, Blyth.—This appears to be the commonest warbler in Sikkim, and in all probability breeds abundantly in the higher parts of the hills. I met with it very frequently, solitary or in families, amongst the rhododendron bushes at elevations from 12,000 to 14,000 feet on the Cholá range, and again from 10,000 to 13,000 or 14,000 in the pine forests of Láchúng valley, associating in flocks with *Lophophanes* and other birds. The specimens shot by me have distinct whitish tips to the larger wing coverts, whereas in birds shot in the plains these are usually wanting, doubtless from their being gradually worn off; my birds also are more yellow beneath, and the axillaries and edge of the wing are clear pale yellow, whilst birds shot near Calcutta are mostly greenish on these parts. There is, however, some variation in this respect.

* If the type of *Phyllopneuste*, Meyer, be *P. trochilus*, the Indian birds ascribed to *Phylloscopus* by Jerdon must be placed in that genus. G. R. Gray, in his recent Hand-list, separates the Indian birds, which he places under *Phyllopneuste*, from *P. trochilus*, *P. rufa*, &c. classing these as *Asilus*, Moehring. I greatly doubt if the separation is justified by the structure of the bird. As I have not the means of clearing up this question, I use Jerdon's generic names.

525 P. FULIGINIVENTER (Hodgs.)—Blyth, Ibis, 1867, p. 21. *Horornis fuliginiventer*, Hodgs. Jerdon, Birds of India, II, p. 162. Short as is Mr. Hodgson's description, it contains the only characters worth noting. There is a mere trace of a pale supercilium, and the under side of the wing is of the same dusky olive as the breast. The tail appears rather rounded, and the legs strong resembling those of *P. Indicus* and *P. affinis*, and probably indicating similar wren-like habits. There is also a decided resemblance in the peculiar coloration of these three species. Wing 2·2 in., tail 1.75, tarsus 0·85, bill from forehead 0.4, from gape 0·5.

I obtained a single specimen in Rhododendron scrub at about 14000 ft. elevation near Momay Samdong. This bird is probably a resident in the higher regions of the Himalayas.

561 P. AFFINIS, Tickell. I shot two or three specimens of the birds in the Láchen and Láchúng valleys at moderate elevations, 8000 to 9000 feet. None were killed before 26th September, but I saw a small bird at Lachúng about the 9th September which might very possibly have been this species, as it had the same peculiar habits. It may migrate to Tibet to breed, but it is, I think, quite as probable that it nidificates in Sikkim.

The specimens obtained by me were hunting in high grass and low bushes for insects in a very wren like manner, or like a *Calamodyta* or *Acrocephalus;* they were very difficult to flush, and settled again at a short distance. The habits of this bird, and its near ally *P. indicus*, appear to me quite different from those of other *Phylloscopi*. I have before (J. A. S. B., 1869, Part II, p. 181) called attention to the *Sitta* - like habits of *P. indicus* when on trees, an observation I have frequently had opportunities of repeating since.

566 REGULOIDES PROREGULUS (Pall.). *R. chloronotus*, Hodgs.—Two specimens obtained in Upper Sikkim at the end of September and beginning of October.

568 R. EROCHROA (Hodgs.).—I shot a specimen at about 13,000 feet on the Cholá range, Eastern Sikkim. It is doubtless a resident.

569 CULICIPETA BURKII (Burton).—A single specimen only procured at Láchúng on the 28th September, together with *Phylloscopus affinis*, hunting in the same manner as that species, amongst low bushes and long grass.

578 ABRORNIS CASTANEICEPS, Hodgs.—Jerdon does not mention the broad yellow rump and upper tail coverts, which are much more brightly coloured and more conspicuous in this species than in *Reguloides proregulus*, (Pall.), and are shewn in the figure in Gray's genera of birds Pl. XLIX. There are one or two other slight omissions in the Birds of India, I therefore venture to give a fresh description.

Head chesnut above with a dusky streak at each side, increasing in breadth and distinctness posteriorly, lores, sides of head and neck, nape, throat, and breast grey, darker on the cheeks and nape; orbital feathers whitish; back

green; rump and upper tail coverts bright yellow; wings and tail brown, edged externally with green, the two outer tail feathers on each side with the inner webs white; wing coverts tipped with pale yellow; margin of the wing, under wing coverts, belly and under tail coverts the same bright yellow as the rump. Iris brown, bill dusky above, deep yellow beneath, legs horny, soles yellowish. Measurement taken before skinning. Length nearly 4 in., wing 2.1, tail 1.65, tarsus 0·65, bill from forehead 0·28, from gape 0·4.

Mr. Blyth, Ibis, 1867, p. 26, says this bird is decidedly a *Reguloides.* So far as the bill is concerned, it appears to me that it might be classed in either of the two genera, between which in part there is no clear distinction; the plumage is rather that of an *Abrornis.*

Troglodytidæ.

333 TROGLODYTES NIPALENSIS, Hodgs.—The Nipál wren is common at high elevations. On the Cholá range I especially noticed it above the range of forest, hunting over the loose moss-covered stones, which frequently form so large a portion of the hill sides, constantly entering the crevices between the blocks, and emerging again at a considerable distance. In the Láchen and Láchúng valleys, it was common in pine forests, at elevations above 10,000 feet. I usually saw the birds in small families, 3 or 4 together, hunting on the ground and low bushes, and with the same predilection for exploring hollows under stones. One of two specimens, from close to the Cholá pass, is an old bird and measures, wing 2 in., tail 1·25, tarsus 0·75, bill from forehead 0·44, from gape 0·53. The other, from Yeomatong, is of decidedly more rufous tint, the bill is shorter and yellow beneath; this is probably a young bird. Its measurements taken before skinning were: Length 4·1, wing 2, tail 1·2, tarsus 0·8, foot 1·35, bill from forehead 0·4 inch.

329 PNOEPYGA SQUAMATA, Gould.—This ranges up to about 9,000 feet in Northern Sikkim. All the specimens I saw belonged to the form called *Tesia rufiventer* by Hodgson which I am disposed to believe distinct from *P. squamata = albiventer*, Hodgs., but I have not sufficient specimens for comparison.

327 SESIA CASTANEO-CORONATA, (Burton).—Not uncommon in Northern Sikkim at 7,000 to 10,000 feet. I saw several, but have only a single specimen. This bird is quite wren-like in habits, but keeps much less to the ground than *Troglodytes Nipalensis.* It is constantly on the move in low brushwood and grass, keeping up mean time a sharp monotonous single note repeated at regular intervals.

527 HOREITES BRUNNEIFRONS, Hodgs.—Mr. Blyth long since, J. A. S. B., XIV, 1845, p. 585, pointed out the similarity of this bird to *Tesia;* except the much longer and slightly more rounded tail of *Horeites*, there is but little

difference in structure between the two genera. The habits are remarkably similar, *Horeites brunneifrons* resembling *Troglodytes* in its movements even more than *Tesia* does. I watched a bird of the present species for at least a quarter of an hour one day, hunting over mossy rocks and diving into the hollows beneath them. If *Tesia* be a wren, I suspect *Horeites* must be classed with it. The note is precisely similar.

I shot *H. brunneifrons* twice in the Láchúng valley between 10,000 and 12,000 feet. Both specimens were moulting their tails, so that I could not take complete measurements. The wing measures 1·85, tarsus 0·75, bill from forehead 0·32, from gape 0·5 inch. The iris is brown, legs pale horny, bill blackish above, yellow near the base of the lower mandible.

Sittidæ.

248 Sitta himalayensis, J. and S.—A single specimen, shot at about 11,000 feet on the Cholá range, differs from Darjiling birds in the paler colour of the head, in a distinct pale spot at the back of the neck, and in the bill being rather shorter. The latter character, however, is slightly variable in most *Sittæ*, and the pale head may be due to immaturity. Length, measured before skinning, 4·75, ins., wing 2·9, tail 1·45, tarsus 0·75, foot 1·5, bill from forehead 0·5. The two outer rectrices on each side have a distinct white spot near their tips much larger, farther from the tip and extending obliquely across the feather in the outer pair smaller, and often confined to the inner web close to the tip in the next.

In Northern Sikkim I observed no *Sitta* above about 7,000 feet.

Certhiadæ.

244 Certhia nipalensis, Hodgs.—Common from 8,000 to 13,000 feet in the pine woods of Northern Sikkim, in which at the time of my visit I found it associating with flocks of *Lophophanes* and *Phylloscopi.* It appears in this region entirely to replace *C. discolor* of Outer Sikkim. Measurement of a fresh specimen: Length 5·5, wing 2·8, tail 2·8, bill from forehead 0·5, tarsus 0·7, foot 1·5 inch. Iris brown, legs horny, bill blackish above, white below.

Paridæ.

637 Lophophanes dichrous (Hodgs.).—I at first thought that this must be a new species, as it agrees very poorly with both Hodgson's original description and Gould's figure in the Birds of Asia. In neither is any notice taken of the conspicuous whitish half collar. I find, however, that Dr. Stoliczka has received specimens from the Western Himalayas closely resembling Sikkim birds, and he tells me that on examining Mr. Hodgson's type specimen he found traces of the collar. I give a fresh description of this tit.

Upper parts dull ashy with a greenish tinge especially on the rump, quills and tail feathers brown with rather grayer margins. Forehead, sides of head and under parts dull buff or dark isabelline rather more rufous behind, sides of the neck isabelline forming a whitish half collar, paler than the underparts. Iris blood red, legs leaden gray, bill black. Length, taken before skinning, 4·6, wing 2·8, tail 1·9, tarsus 0·8, bill from forehead 0·33 inch.

Far from scarce in the higher pine forests of the Chola range, and common in Northern Sikkim from 8,000 to 13,000 feet, associating with the next two species.

641 L. Beavani (Blyth).—? *Parus Atkinsoni*, Jerdon, Birds of India II, p. 276.

Adult. Head above with moderately long crest, glossy black; nuchal spot and a large white spot on each cheek commencing in front at the gape and including the ear coverts white, often tinged with yellow; back dark ashy grey, often with an olivaceous tinge, wings and tail dark brown with bluish grey edging, inner margin of quills white; chin, throat and upper breast black without gloss, lower breast and abdomen rather pale grayish brown, more rufous behind; axillaries, under wing coverts and lower tail coverts pale ferruginous. Iris brown, legs leaden gray, bill black. Wing 2·6 to 2·8, tail 1·84 to 2·05, tarsus 0·73 to 0·8, bill from forehead 0·33 to 0·38 inch. These are the extreme measurements of six specimens.

Young bird. Top of head glossless black, spots on nape and cheeks usually pale primrose yellow, sometimes white, the black of the chin and throat ill-defined and passing gradually into the dull olivaceous gray, more or less rufescent on the abdomen. Crest very slightly developed. I cannot help suspecting that this is Dr. Jerdon's *Parus Atkinsoni*, the only difference appears to be the length of the tarsus in that form, which is less than in any specimen of *Loph. Beavani* which I possess, otherwise the measurements correspond exactly.

Loph. Beavani is by far the most common tit in the pine forests of Sikkim. Both on the Chola range, and in the northern valleys, I met with it in abundance.

I am inclined to believe that the upper figure in the plate of *L. rubidiventris* in Gould's Birds of Asia, pt. XI, represents this species.

642 L. Æmodius, (Hodgs.). Mr. Blyth pointed out in the Ibis for 1867, p. 34, that this bird is a *Lophophanes.* Not only is it so, but the crest is comparatively longer than in allied species. No complete description appears ever to have been given of it.

Adult. Head above and a long recurved crest glossy black; a rather large spot on the nape, and on each side of the head and neck, extending from the gape below the eye to a considerable distance behind the ear coverts, pure white; back dark ashy, often tinged with olivaceous, passing into

dull olive on the rump, wings and tail brown, edged olivaceous externally, the quills with whitish inner margins; all the larger wing coverts and some of the smaller primary coverts with white or isabelline spots, forming two very well marked bars; chin, throat, and upper breast, with the sides of the neck and breast, behind the white spot black, lower breast and abdomen fawn colour, flanks and under tail coverts rather olivaceous. Iris dark brown legs leaden gray, bill black. Length before skinning 4 to 4·1, wing 2·3 to 2·4, tail 1·65 to 1·8, tarsus, 0·65 to 0·7, bill from forehead 0·27 to 0·3 inch.

In the young bird the head is dull black, cheek spots primerose yellow, back olive, chin and throat brown, breast and abdomen olivaceous.

This is rather less common than the other two species but it is far from rare in the Sikkim pine forests and has the same distribution. It is closely allied to *L. melanolophus*, (Vig.), but the coloration of the under parts is different.

In September and October, these three crested tits were found, old and young, associating in large flocks, together with *Phylloscopi*, *Certhia nipalensis*, and, below 10,000 feet, with *Yuhinæ*, *Minla ignotincta* and some other *Leiotrichinæ*, and *Siphia strophiata*. The tits are perhaps the most abundant of all, and may be seen actively hunting over the stems and branches of the different trees, pines, birch, &c. for insects.

635 ÆGITHALISCUS IOUSCHISTUS, (Hodgs.).—Forehead, centre line of head and nape, a collar completely encircling the neck, a band from the base of the lower mandible on each side, passing below the ear coverts, and all the lower parts, except the chin and throat, rufescent fawn, or dull ferruginous, lores and sides of head including a broad stripe over each eye, and a narrower one underneath, uniting behind and running back past the nape, glossy black; ear coverts fawn colour with black mixed; back grey with an olivaceous tinge, quills and wing coverts dark brown with slightly paler edgings externally, the quills with whitish inner margins; lower wing coverts paler fawn than the breast. Tail brown, the central rectrices darker on the inner web, the three inner pairs with bluish grey edges, the three outer pairs with the terminal half or rather more of the outer web whitish, and a small portion of the inner web near the tip. Chin dusky black, throat and centre of foreneck silky white, mixed with black. Iris *yellow*, (not brown as stated by Hodgson), legs yellowish brown, bill black. Length taken before skinning 4·5 inches, wing 2·25, tail 2·1, tarsus 0·7, bill from forehead 0·28 inch.

I met with this bird but twice. On the first occasion a flock of 20 or 30 were hunting about on birch and pine trees at about 10,000 feet near Láchúng; on the second occasion a smaller flock were similarly occupied at about 9,000 feet in the Láchen valley.* It is probably only found in the pine forests of Northern Nipal and Sikkim.

But for Gould's figure in the Birds of Asia, it would be difficult to recognise this bird.

Motacillidæ.

MOTACILLA HODGSONI, G. R. Gray, Ibis, 1865, p. 49.—? *M. lugubris* Pall. ? *M. Cashmiriensis*, Brooks.

I am rather surprised to find that all the *Motacillæ* shot in Upper Sikkim are of a species distinct from any found in the plains of India. I can scarcely have any doubt but that they belong to *M. Hodgsoni* of Gray, although it is probable that skins upon which that species was founded represent the winter, or at least the autumn plumage. I have two specimens agreeing well with Mr. Blyth's very brief account in the Ibis, having very little of the throat white and a distinct black line from the gape below the eye, but from the appearance of the chin and from another specimen in which the change to winter plumage has not proceeded so far, it is evident that in full summer garb the whole throat and chin are black, just as in *personata*, from which this form is chiefly distinguished by its black back in the breeding season, and its rather longer bill. I will give a somewhat more complete description of the summer and winter plumage of this bird.

Summer.—Forehead and forepart of crown and superciliary stripe, a large wing patch formed of the secondary, greater and medium coverts, narrow edges and tips to the primary quills and broad ones to the secondaries, two outer tail feathers, frequently but not always with the exception of the inner edges of the inner of the two or of both, and lower parts from the breast white, the rest of the plumage black. Perhaps the extreme chin and a narrow stripe running back from each side of the base of the lower mandible may remain white, but I suspect not.

In winter plumage, the bird appears scarcely to differ from *M. Luzoniensis*. In a specimen shot on October 4th, there is still a broader gorget on the breast than in that species, but otherwise there is no difference. The whole face is white, the moustachial stripe having vanished. The back is grey, hinder part of crown and nape black, wings and tail feathers as in summer plumage, except that the wing patch is not quite so pure a white. The flanks are greyish. It is possible that this may be an example of *M. Luzoniensis*, but I think not. All these species of wagtail are nearly undistinguishable in winter dress.

The intermediate plumage, which I suppose to be that on which the species was founded, has the face white, except a line from the gape below the eye, and including the ear coverts. The dimensions are

	Wing.	Tail.	Tarsus.	Bill from forehead.	Bill from gape.
1	3·7	3·65	1	0·57	0·72
2	3·7	3·5	0·96	0·52	0·72
3	3·45	3·45	0·9	0·53	0·7
4-winter plumage	3·7	3·7	0·97	0·5	0·7

Young birds are uniformly grey on the head and back, sides of head and lower parts white, with a narrow black pectoral gorget.

Without specimens I cannot tell if this bird differs from *M. lugubris*, Pall. The Japanese bird called *M. lugens* by Temminck and Schlegel in the *Fauna Japonica* (*M. japonica*, Swinhoe), and considered by them to be Pallas's bird, is shewn by Tristram (Ibis, 1866, p. 291,) to be entirely distinct, it being easily recognised by the greater portion of the primary quills being white, and Mr. Tristram considers the true *M. lugubris*, Temminck, to be an African species. But Mr. J. R. Gray in his 'Hand list' gives the locality for *M. lugubris*, Pall., (a different bird probably from Temminck's) as Northern Asia and Persia, and quotes the figure in Gould's birds of Europe.

Now the bird in winter plumage on Gould's plate agrees very well with *M. Hodgsoni*, and the bird in summer plumage only differs in having a narrow white line from behind the eye to the lower breast somewhat as in *M. alba*. The figures rather exceed the Sikkim birds in size, but in most of Gould's figures the dimensions are a little too large. The bill too in the plate appears a little shorter. I cannot, therefore, feel sure that the forms are identical, but I think it very probable that they are.

I met with no wagtails in Eastern Sikkim, but on ascending to about 12,000 feet in the Lachung valley I found them common. It is probable that they breed here, for I had seen none in the lower valleys, and but few migratory birds had made their appearance on September 11th when I first met with them. All were beginning to change their plumage.

Budytes viridis, Gm.—A single young specimen in grey plumage was obtained at Yeomatong (12,000 feet) on the 13th September. It was doubtless migrating.

Alaudidæ.

596 Pipastes agilis ? Sykes.—Whether the common Indian tree pipit is to be called *P. plumatus*, Müll., *P. arboreus*, Bechst,, *P. agilis*, Sykes or *P. maculatus*, Hodgs., I must leave others to decide. On Mr. Blyth's authority, Dr. Jerdon in his appendix refers *Anthus agilis*, Sykes, to *A. arboreus*, and substitutes Mr. Hodgson's name *maculatus* for the Indian race. Mr. Blyth in his commentary in the Ibis, 1867, p. 31, uses Sykes's name, but says that Sykes's type has more the appearance of the European *trivialis* (= *arboreus* = *plumatus* teste Gray Hand list, p. 251). Von Pelzeln (Ibis, 1868, p. 312,) is inclined to unite the Indian and European forms, but almost all European writers keep them distinct.* Lastly Mr. Hume (Ibis, 1870, p. 287,) points out that in his large collection he has representatives of all the varieties of the European tree pipit, together with numerous forms intermediate between them and the forms described by Hodgson and Sykes,

* Comp. Walden, Ibis, 1868, p. 312 note. Gray, Hand list l. c., &c.

but he adds that there are several of his Indian types unrepresented by European specimens. Under these circumstances I cannot help thinking it highly probable that there are really two distinct races, one found in Europe and Western Asia, the other in Eastern Asia, and that the two meet in India, and in the countries due North of India in which they interbreed. We know that India is the limit of Eastern and Western forms in several migratory birds, as *Motacilla Luzoniensis* and *M. alba*;* *Erythrosterna parva* and *E. leucura*, &c., and the same may very possibly be the case with the tree pipits. Chinese examples would go far to settle this question. If they are identical with the species from Bengal, whilst birds from Western India are, as we are assured, undistinguishable from European examples, it will be fair to look upon intermediate forms as hybrids.

I saw no tree pipits in Eastern or Northern Sikkim until about the 20th September, then they appeared in considerable numbers. Two specimens which I have preserved are more olive above and more fulvous below than those usually shot in the plains of India. They have broad fulvous edges to the wing coverts and green margins to the quills, whilst these are whitish in birds from Central India.

Comparing my specimens with the figure of *Anthus arboreus* in Gould's Birds of Europe, the bill in the former appears decidedly larger.

601 Anthus striolatus, Blyth.—Common in all the northern parts of Sikkim. I found it in clearings at a little below 7,000 feet early in September, and at Phalung above 15,000 in the beginning of October.

605 A. rosaceus, Hodgs.—It is, I believe, pretty generally admitted that this bird is distinct from (*A. Cecilii*, Sav. (= *A. cervinus*, Pall.). Mr. Hume is doubtful on the subject (Ibis 1871, p. 35), but Mr. Tristram (ib. p. 233,) is decidedly of opinion that it is a different race, and he further separates as *A. japonicus*, Temm. and Schl., the race found in China, Eastern Siberia,† &c. Whether the latter be not *A. rosaceus*, Hodgs., in winter plumage remains to be determined. I cannot believe that the birds with olive backs and yellow axillaries which abound in Sikkim are represented by any stage of plumage of *A. Cecilii*; at least such specimens as I have seen are certainly different. Specimens obtained by Major Godwin-Austen on the Khasi Hills were precisely like mine from Sikkim.

I found *Anthus rosaceus* common on the Cholá range in August, and in the valleys of Northern Sikkim, from 12,000 to 15,000 feet. It doubtless breeds at these elevations, and it is, I believe, a constant resident in the Himalayas, rarely or never descending to the plains. I presume Mr.

* Can *M. dukhunensis* be a hybrid race between these two. Some specimens from Western India have no more white on the wings than the European bird.

† Mr. G. R. Gray does the same in his Hand list, but marks *A japonicus* as doubtful.

Tristram means the Himalayas by North India, when he says that this bird is common in the latter at all seasons. The distinction is important. Most Anglo-Indians when they speak of North India, mean the Panjab and North-West Provinces, not the Himalayas, and the fauna of the two regions is quite different.

761 Alauda (*Calandrella*) brachydactyla, Temm.—Common in flocks in all the higher valleys of Northern Sikkim above 12,000 feet. I found it especially abundant at Yeomatong 12,000 feet, Momay, 15,000, and Phalung 16,000. At the latter place early in October the short toed larks were in flocks of several hundreds, just as they are found in March in the plains of India.

Jerdon, in the generic character of *Calandrella*, assigns a minute first primary to this bird. I cannot find it in any Indian specimens, and I have examined skins from Bengal, the North-West Provinces, aad Nágpúr besides those from Upper Sikkim. That it is also absent in European and African specimens is, I think, clear, because *Cabanis* in the Museum Heineanum, places *Calandrella (Calandritis*, Cab.) with *Otocorys* in a distinct subfamily from the other larks on account of their wanting the rudimentary first primary.

Otocoris Elwesi sp. nov. *O. torque frontali tenui, loris, genis, pileo cristis duobus sincipitalibus, et fascia lata pectorali nigris; fronte superiori, superciliis latis, regione auriculari, lateribus colli, mento, gula, pectore, inferiori abdomineque albis; nucha, cervice, uropygio et tectricibus alarum pallide griseo-lilacinis; dorso pallide brunneo, unâ cum supracaudalibus fusco-striato; remigibus brunneis: primi pogonio externo albo, primariis cæteris albescente-, secundariis albo marginatis et terminatis; tribus remigibus ultimis elongatis, et rectricibus mediis brunneis, latissime fulvo-limbatis, cæteris rectricibus nigricantibus, duobus externis utrinque albo limbatis et terminatis; rostro nigro, sublus ad basin pallido, pedibus nigris. Long. tota* 7·75: *long. alæ* 4·7, *caudæ* 3·2, *tarsi* 0.9, *digiti posterioris cum ungue* 0·75, *unguis modo* 0·38, *rostri a fronte* 0·4, *a rictu* 0·6.

Narrow frontal band, lores, sides of head below the eye, and a band running back below the ear coverts, but not extending down the sides of the neck, crown of the head, two sincipital tufts, and the upper part of the breast black; forehead above the black band, broad supercilia running back from it, with the ear coverts, sides of the neck intervening between the black of the cheeks and that of the breast, throat lower breast and abdomen white; nape, back of neck, rump and wing coverts pale greyish lilac; back pale fulvous brown with narrow dusky central stripes to the feathers, upper tail coverts long, pale brown with narrow central stripes and whitish edges; quills brown, the first primary with a white outer web, remaining primaries with narrow isabelline edges and tips which become white on the secondaries, the three

last quills (tertiaries) and the central tail feathers brown with broad fulvous margins, the other tail feathers blackish with very narrow pale tips which can only be apparent in a freshly moulted specimen, the two outer rectrices on each side edged aad tipped with white, most broadly on the outermost in which nearly the whole outer web is white ; wing lining white ; flanks fulvous ; bill black above, pale near the base below ; legs black, soles of feet yellowish.

This species is nearer to *O. penicillata* than to *O. longirostris.* It is distinguished from the former by the black of the sides of the neck not joining that on the breast, and apparently by its more lilac coloration. From *O. longirostris* it differs in its much shorter bill, black legs,* paler tints of the upper plumage, and the purer white of the lower parts. Specimens of *O. longirostris* in the Indian Museum have no black frontal band at the base of the bill, and the black of the crown is not distinctly defined, but passes into the brown of the nape, whereas in the new species the margin is distinct.

From *O. alpestris* it differs entirely in coloration, it is much paler above and purer white below, it wants the broad dark centres to the feathers of the mantle, and although my specimen is evidently in freshly moulted winter plumage, there is no trace of yellow on the head. Judging from Gould's figure in the Birds of Europe, *O. alpestris* wants the black frontal band of *O. Elwesi,* and the hind claw in the former is decidedly longer.

Three specimens of this horned lark were shot by Captain Elwes close to Kongra Lama pass, between 15,000 and 16,000 feet. I did not myself notice any at this spot, but I believe I saw some near the Donkia pass at nearly 18,000 feet elevation. The only specimen I possess, for which I am indebted to Captain Elwes, is in beautiful condition, having evidently first completed its autumnal moult.

Accentoridæ.

So far as I can judge, the Accentors have as good a claim to form a distinct family as the buntings or larks have. Scarcely any two ornithologists assign the same poition to them, they rank alternately as thrushes, warblers, *Ampelidæ* and finches.

652 Accentor nipalensis, Hodgs.—This bird was by no means rare at high elevations in the Láchúng valley. Elwes obtained it at the Tankra-lá. I shot it on the hills above Yeomatong, and near Momay Sámdong. I never saw it below 14,000 feet, nor far from a glacier, indeed the moraines of glaciers appeared to me its most common haunt. Sometimes it was solitary, but more frequently three or four birds occurred together, on the ground or on rocks. In the Láchen valley I did not meet with it, and in the upper part of that valley, it appeared to be completely replaced by *A. rubeculoides.*

* Two specimens of *O. longirostris* from the Western Himalayas in the Indian Museum have brown legs, like the figure in P. L. S. 1855, Aves, pl. CXI.

654 A. STROPHIATUS, Hodgs.—I obtained at Yeomatong, about 12,000 feet above the sea, a single specimen of what may be the young of this species. It differs in the breast being fulvous with broad black streaks instead of uniformly ferruginous. The claws too appear to be a little straighter. It is possible that this may be distinct, but it is at least equally probable that it is a young bird.

I am indebted to Mr. W. S. Atkinson for an adult specimen of *A. strophiatus* obtained on the Singalelá range.

656 A. RUBECULOIDES, Hodgs.—This bird was only seen in the Upper Láchen valley above 14,000 feet, together with *Leucosticte hœmatopygia*, *Otocoris Elwesi*, and other birds belonging evidently to the Tibetan fauna. Whole head and neck greyish brown, rather browner above, and greyer below, back feathers blackish brown with broad rufous brown margins, shoulder of wing greyish brown, the quills and coverts dark brown with rufous or fulvous brown margins, broader on the last secondaries and coverts, and both ranges of the latter with whitish tips, tail feathers the same colour as the quills with very slight pale edges, breast ferruginous, abdomen whitish, flanks fulvous with a few dark streaks; iris clear pale brown, bill black, legs reddish brown. Dimensions taken before skinning: length 6·3, wing 2·9, tail 2·55, tarsus 0·95, bill from forehead 0·45 in.

This bird was met with on hill sides, and had, like *A. nipalensis*, an especial preference for the piles of loose blocks of rock and stones so common at high elevations and in glacier regions.

Fringillidæ.

MYCEROBAS MELANOXANTHUS, (Hodgs.).—Two or three specimens were seen at moderate elevations in Northern Sikkim. For the only one I have I am indebted to Captain Elwes. It was shot at about 11,000 feet in the Láchúng valley near Yeomatong.

PYRRHULA ERYTHROCEPHALA, (Vigors).—I shot one specimen at about 11,000 feet on the Cholá range, and another at the same elevation in the Láchen valley. It appears not to be a common bird in Northern Sikkim.

The head in the male is dull scarlet or bright ferruginous rather than dull crimson, chin black, and the white tips to be larger wing coverts are wanting in adults; the primary coverts in both sexes are dull black throughout, outer secondary coverts black with grey tips, the black decreasing in amount towards the body.

A young male has the head greenish like the female, but with some dashes of red, the throat and flanks also greenish, middle of the breast ferruginous.

	Wing.	Tail.	Tarsus.	Bill from forehead.
Male, ...	3·1	2.55	0·65	0·36
Female, ...	3·	2·5		0·35

Central tail feathers in both sexes about half inch short of the outer ones.

P. NIPALENSIS, Hodgs.—One specimen obtained on the Láchen valley at about 10,000 feet. Like the last it did not appear to be of frequent occurrence. Neither Captain Elwes nor I obtained the rare *P. erythaca*, Blyth.

733 PYRRHOPLECTES EPAULETTA, Hodgs.—A male was shot by Captain Elwes at about 11,000 feet on the Cholá range. No specimens were obtained in Northern Sikkim, nor was this bird seen there.

Carpadacus. A female or young male shot near Láchúng differs both in coloration and structure from the female of *C. erythrinus.* The bill is longer and more pyrrhuline, the colour is uniformly hair brown above, darker than in *C. erythrinus*, and with no dark centres to the feathers, nor pale tips to the wing coverts, the rump alone having an olivaceous tinge. Beneath it is white, sullied on the throat, breast and flanks ; darkest and with faint brown mesial streaks to the feathers on the breast. Wing 3·2, tail 2·2, tarsus 0·72, bill from forehead 0·45 inch.

About Chúngtám and Látong at the end of September I found flocks of rose-finches which at the time I took for *C. erythrinus* in summer plumage. I only preserved a male, but this also appears to have a larger bill than the common Indian rose-finch. I find another male specimen in the Indian Museum from Leh in Western Tibet, apparently of the same race. It is highly probable that these birds are the males of the above species.

It is doubtless also to this form that Bonaparte alludes (Consp. Gen. Av. I, p. 534,) under the head of *Carpodacus erythrinus*, when he says "*Specimina ex Kamschatka a cl. Kittlitzo allata in Mus. Maguntiæ vidimus, 'rostro latiore, magis incurvo ; rubro colore vividiore, nec roseo, nec coccineo, 'tergo magis rubente.*"

740 PROPASSER THURA, Bon. *P. frontalis*, Blyth.—This beautiful rose finch is common on the Cholá range above 12,000 feet, keeping mostly to the rhododendron bushes, but sometimes seen on grassy hill sides. It was rare in Northern Sikkim. The birds at the time of our visit were single or in pairs, and were probably breeding; but I saw no young ones. It was doubtless later in the year that they were found in flocks on mount Tonglú by Captain Beavan, at a lower elevation than any were seen by us. (Ibis, 1868 p. 177).

The following are the dimensions of *P. thura* taken from freshly killed specimens :—

	Length.	Wing.	Tail.	Tarsus.	Bill from forehead.
Male,..................	6·5	3·25	3·	1	0·48
Female,................	6·5	3·2	2·75	0·98	0.46

Since returning from Darjiling I have received from Mr. Mandelli an undescribed species of the genus, obtained on the Singalelá range. This I have called *P. saturatus.*

747 Pyrrhospiza punicea, Hodgs.—A single male of this large finch was shot by me at about 14,000 feet elevation on the Chola range, on a grassy hill side, with scattered bushes, and in the neighbourhood of rocky crags.

746 Procarduelis Nipalensis, Hodgs.—I saw this bird once or twice on the Cholá range at about 13,000 to 14,000 feet elevation, and a specimen was, I think, shot by Captain Elwes. It was seen on open grassy ground with scattered rocks and scrub rhododendron.

750 Chrysomitris spinoides, (Vigors).—Common in small flocks up to about 9,000 feet locally in the Láchúng valley, keeping to clearings or grassy hill sides. I did not notice the Siskin either on the Cholá range or at high elevations in Northern Sikkim. It probably breeds at moderate altitudes. I found flocks early in September as low as 7,000 feet, at Kedám, between Chúngtám and Láchúng.

753 Fringillauda nemoricola, Hodgs.—Elwes obtained one specimen which, I believe, belonged to this species, at the Tankra pass. I did not meet with the bird myself, nor have I compared Elwes's specimen since returning, but this bird has been frequently obtained in Sikkim before. (Blyth, Ibis, 1867, p. 45).

Leucosticte hæmatopygia, Gould.—I only met with this bird within a mile or two of Kangra Lama pass, at an elevation exceeding 15,000 feet. There it was abundant in flocks of 15 or 20. It has a rather swift flight, and from the nature of the country it inhabits, in autumn at all events, must always settle on the ground or on rocks.

In none of my specimens are the pink edges to the feathers of the rump much developed, and in some, doubtless young birds, they are entirely wanting; the distinction is not sexual, for I have more than one female in which they are fairly developed. The head too is much paler in colour than in Gould's figure in the Birds of Asia; some specimens have the head feathers dark at the base with broad brown margins, which would doubtless wear off in the spring as in *Euspiza melanocephala.* The iris is brown; bill black, except at the base of the lower mandible, where it is greenish; legs black. Dimensions taken on fresh specimens.

	Length.	Wing.	Tail.	Tarsus.	Bill from forehead.
Male,..........................	7	4·6	3·1	0·85	0·45 inch.
Female,........................	7	4·3	3·1	0·85	0·42 „

Montifringilla ruficollis, *sp. nov. Mas capite dorsoque pallidescente brunneis, hoc late fuscescente striato; fronte albescente, uropygio rufescente; superciliis, genis, mento et gula media albis; loris, linea infraoculari, (postice supra regionem auricularem producta et brunnescente,) et striis duobus gularibus, una utrinque ab mandibuli producta, postice divergentibus, nigris; regione auriculari et colli lateribus ferrugineis, spatio parvo albo subtus ad*

gulam interveniente; remigibus brunneis, extus, primo excepto, fulvo-, intus albo marginatis; primi pogonio externo et pennarum singularum, præter 4 primas et tres ultimas, maculis magnis basin versus pogoniorum internorum albis; tectricibus alarum minoribus plerumque albis; angulo alæ grisescente; supracaudalibus fulvis elongatis, rectricibus mediis fusco brunneis, fulvo marginatis, cæteris basin versus pallide cinereis, postice et ad margines albescentibus, terminationibus semipollicaribus cum rectricibus mediis concoloribus; pectore abdomineque albis, vix fulvo tinctis; iridibus rufescenti-brunneis, rostro pedibusque nigris. Long. tota 6, *long. alæ* 3·75, *caudæ* 2·35, *tarsi* 0·82, *rostri a fronte* 0·42, poll. (Angl.).

Fœmina fronte albescente et uropygio rufescente; torque collari subtus haud interrupto, postice brunneo. Habitat in Tibet.

Male. Forehead whitish passing into the rather pale umber brown of the head; supercilia white; lores and a line from them passing under the eye black, this line is continued posteriorly over the ear coverts, and its colour changes to dark ferruginous; back umber brown with broad central dusky streaks to the feathers, rump more ferruginous; wings brown, the first primary with the outer web white, the others with fulvous outer margins, all with white internal edges, and a broad white wing band, only visible on the expanded wing, formed by a large spot on the inner webs of all the primaries except the first four, and the whole basal portion of the inner web of the remaining quills except the last three, which have broad fulvous borders; smaller wing coverts mostly white, angle of the wing greyish. Upper tail coverts very long, pale umber with a fulvous tinge; central tail feathers and the tips of the remainder for about half an inch dark brown with fulvous margins, basal portion of all the tail feathers except the central pair pale ashy with some white on both inner and outer webs between the grey portion and the brown tips, increasing in quantity on the outer feathers, and running up the external web which is entirely white in the outermost pair. Sides of the head below the black eye streak, chin and throat white, with two black lines, one from each side of the base of the lower mandible, running backwards and diverging; ear coverts bright ferruginous, sides of the neck the same, but a little paler, the rufous tint forming a demi-collar, only interrupted for a very narrow space in front; remainder of the lower parts white with an isabelline tinge. Iris reddish brown, bill and legs black.

The female wants the whitish forehead and the rufescent tinge on the rump; the demi-collar is brown posteriorly, and, in the only specimen obtained, it is continuous round the front of the neck.

The dimensions given above were taken from a male before skinning. The following are taken from two other skins, a male and a female.

	Wing.	Tail.	Tarsus.	Hind claw.	Bill from forehead.	Bill from gape.
Male,.......	3·63	2·28	0·85	0·36	0·42	0·58
Female,......	3·56	2·1	0·87	0·32	0·43	0·54

This bird differs widely from every described form. In structure it is closely allied to *M. nivalis*, and differs from *Leucosticte* in its shorter wings and tail. The plumage may become whiter in the winter.

I met with one flock of this new finch near Kangra Lama pass, and with another at Phálúng, both places inhabited by purely Tibetan forms, and at elevations of 15,000 to 16,000 feet. It is probably common in Tibet. Dr. Stoliczka is of opinion that it is the same as the undescribed *Montifringilla* found by him in Ladak (J. A. S. B., 1868, pt. II, p, 62), but of which his specimen is not now in Calcutta.

Corvidæ.

657 CORVUS CORAX, L. (*C. Tibetanus*, Hodgs.).—I give the measurements of four birds taken before skinning. They do not exceed those given by H. von Pelzeln (Ibis, 1868, p. 316,) from Dr. Stoliczka's notes, so that it is improbable that the Eastern race is really distinct. Mr. Blyth appears to consider the Tibetan bird identical with the European, (Ibis, 1870, p. 169, note,) and I learn from Captain Elwes that Dr. Jordon is of the same opinion, indeed he placed *C. Tibetanus* amongst the doubtful species in his Appendix.

	1.	2.	3.	4.
	Male.	Female.	Sex not ascertained.	
Length,...........................	27·	25·5	25·75	25·5
Wing, ...	19·25	19·	18·75	19·
Tail, ...	11·5*	10·75	11·	11·
Tarsus, ...	3·	2·4†	2·75	2·75
Length of bill from gape,......	3·25	2·85†	3·	3·
Height of ditto, ...	1·3	1·1†	1·25	1·25

The wings when closed just reach the end of the tail which is very distinctly wedge-shaped. Iris very dark brown.

Ravens were not seen much below 14,000 feet, but above that elevation they were common both on the Chola range and in Northern Sikkim.

660 CORVUS VAILLANTI,‡ Less. (*C. culminatus*, Sykes).—Some specimens from Northern Sikkim are so much larger than any from the plains of India that I am strongly disposed to think them distinct, but other specimens from the same locality are no larger than those from Calcutta.

There is considerable variation in the size of this species in India, as the following series of measurements will shew:—

* In the dried specimen the tail measures only 10·5, and the height of the bill is 1·15, tarsus 2·7.

† These measurements are from the dried skin.

‡ Lord Walden in the Ibis, 1868, p. 165, note, has pointed out that Lesson's name *C. Levaillantii* (potius *Vaillanti*) has priority over Sykes's.

	Wing.	Tail.	Tarsus.	Bill from gape.
♂ Calcutta (in Indian Museum,)............	11·6	6·75	2.17	2·45
♀ Ditto ditto,..	12·	8·	2·35	2·5
? Ditto ditto, ...	12·5	7·5	2·28	2·5
♂ Godavari valley,.................................	12·5	7·25	2·05	2·3
♀ Ditto, ...	11·6	6 75	2·1	2 3

Whilst two specimens shot at Láchúng had the following dimensions :—

	Wing.	Tail.	Tarsus.	Bill from gape.	Whole length.
1, ...	14·25	9·5	2·4	2 35	21·75
2,............	13·25	8·75	2·4	2·35	20·

Neither of these had completed its moult, but probably the longest quills and tail feathers are full grown. A specimen obtained by Dr. Stoliczka in Western Tibet measures

Wing.	Tail.	Tarsus.	Bill from forehead.
13·5	9	2·4	2·45

And in all the bill, although not longer from the gape, is stouter and higher, and the gonys apppears longer. But on the other hand a specimen brought by Captain Elwes from Láchúng has the wing only 12·2, tail 8 inches, whilst a specimen from the Cholá range has the same measurement precisely. The sexes are unfortunately not recorded on my specimens.

Under all the circumstances I do not like to propose a new name, but it is quite possible that the Himalayan form is larger than that found in the plains of India. The dimensions given by Jerdon for *C. culminatus*: length 21 inch, wing 13½, tail 7½, equal those of Himalayan specimens. This variability in size probably explains the difference of opinion between Mr. Blyth, (Ibis, 1868, p. 132,) and Captain Beavan with Colonel Tytler (Ibis, 1867, p. 328), as to the distinction, or otherwise, of the Andaman crow. Specimens of *C. Vaillanti* from Malacca precisely resemble those from Bengal.

Crows were common up to about 13,000 feet, above which elevation they seemed to be replaced by ravens. They appeared far more abundant about 8,000 feet in the higher valleys than below that elevation ; there were large flocks of them near most of the villages, but, as usual with *C. Vaillanti,* not about houses like the Indian *C. splendens.*

666 Nucifraga hemispila, Vigors.—This is rare on the outer ranges of Sikkim, but common in the pine forests of the interior. It is not a very wary bird, but is usually to be seen on the edges of open glades or on trees outside the forest. Its cry and flight are both decidedly corvine. I once saw a pair hawking after butterflies just as crows may sometimes be observed to do ; the white of the outer tail feathers becomes very conspicuous when the birds are thus engaged. The iris is dark brown.

679 Fregilus graculus, L., *F. Himalayanus,* Gould.—Von Pelzeln has pointed out (Jour. f. Ornith. for 1868, and Ibis, 1868, p. 317), that

there is no constant difference in size between the Western Himalayan choughs and *F. graculus.* But my specimens from Sikkim with one exception, a female and probably a young bird, somewhat exceed the dimensions given by v. Pelzeln.*

	Wing.	Tail.	Tarsus.	Bill from gape.
Male from Sikkim,	12·75	6·5	2·4	2·3
Three females, ditto,	11·5 to 12·3	5·8 to 6·8	2·2 to 2·35	2· to 2·3
Male from Switzerland, v. Pelzeln,	12·17	5·52	2·07	2·41

I have unfortunately only one male specimen. In the smallest specimen brought down by me the wing does not exceed eleven inches.

The red-billed chough is rather scarce on the Cholá range. I only saw it once at about 13,000 feet elevation. In Northern Sikkim it abounded from about 9,000 to 16,000 feet; at Momay Samdong there were many about the houses, as noticed by Hooker, and at first they were not wary, but a few shots soon made them wild. They are usually seen about places where yaks have been herded, hunting for insects under the dung, but they also feed on berries and seeds. The iris is brown.

680 F. PYRRHOCORAX, (L.)—Dr. Stoliczka found the yellow-billed chough common in Western Tibet, whilst the red-billed bird was comparatively scarce. In Northern Sikkim precisely the reverse is the case. The red-billed chough abounds, whilst the Alpine chough was only seen once. I found a flock, five or six miles, below Kongra Lama in the Láchen valley at a little below 15,000 feet, and at a place where the fauna was principally Tibetan, and I shot one bird which measured: length 16 inches, wing 11·25, tail 7·5, tarsus 1·75, bill from forehead 1·1. The iris is brown, bill yellow, feet red. The crop contained small black berries. I fail to see the necessity for placing the two choughs in distinct genera.

Garrulus bispecularis was not seen during the journey, although Captain Elwes obtained a specimen from, I believe, the Singalela range. *Urocissa flavirostris* I saw at Láchúng frequently, but not above 8,000 feet.

Order—COLUMBÆ.

Columbidæ.

783 ALSOCOMUS HODGSONI. (Vigors).—Captain Elwes shot this wood pigeon at about 13,000 feet elevation near the Tankra-lá. I did not meet with it.

790 COLUMBA LEUCONOTA, Vigors.—Locally distributed throughout the higher ranges of Sikkim, very common in places, rare in others. This is of course the pigeon to which Hooker refers as almost the only animal food he could obtain at this place (Him. Jour. II, p. 72).

* Von Pelzeln's measurements are, I presume, in Vienna inches and lines; these I have, for the sake of comparison, converted into English inches. If his measurements are in Paris inches and lines, they would be rather more.

I never noticed this pigeon above about 13,000 feet. Its habits and flight are very similar to those of the common rock pigeon.

Order—GALLINÆ.

Pteroclidæ.

SYRRHAPTES TIBETANUS, Gould.—This fine sand-grouse does not occur in Sikkim, but it appears to be found just north of the frontier in Eastern Tibet, and four live birds were presented to us by the Governor of Kambajong. They differed from Gould's figure in the Birds of Asia in having the ferruginous gorget extending completely round the back of the neck, although narrower behind than at the sides.

In captivity these birds were rather noisy, their double cry being frequently uttered. I succeeded in bringing two to Calcutta alive, but they only survived a few days, although apparently in health when they reached the plains.

Phasianidæ.

804 LOPHOPHORUS IMPEYANUS, (Latham).—The monal is not a common bird in Sikkim, it is, however, found throughout the higher parts of the country at a higher elevation than any other species. In September I occasionally saw birds as high as 14,000 and 15,000 feet, above the level of forest. They are very wary, and keep much to the rhodondendron scrub which usually covers the sides of the valleys for some distance above the limits of the pine trees; I have occasionally seen them feeding in the open towards evening.

805 CERIORNIS SATYRA, (L.)—The horned pheasant is always called Monal by the Ghorkas and other Hindustani speaking people of Sikkim. It inhabits a lower zone than the true Monal, but I never saw it below 8,000 feet in Northern Sikkim. In winter it may descend lower. It appeared to me to be decidedly scarce in the Láchen and Láchúng valleys; far more so than it is on the higher hills around Darjiling, or than we found it to be on the Cholá range.

807 ITHAGENIS CRUENTUS, (Hardwicke).—Not rare on the Cholá range, but more common in the pine forests of the Láchúng valley. I shot it only in the latter, in September, in flocks of 10 to 15 birds, males and females in about equal proportions, and the young birds of the year in the same plumage as the old ones, but easily distinguished by the absence of spurs on their legs. The old birds had recently moulted and their tails were not full grown.

All that I saw were in the pine forests around Yeomatong, where they were tolerably abundant. They rarely take flight even when fired at, but run away and often take refuge on branches of trees. I have shot five or six out of one flock by following them up; they usually escape up hill,

and if, as frequently takes place, the flock has been scattered, after a few minutes they commence calling with a peculiar long cry, something like the squeal of a kite. The only other note I heard was a sharp monosyllabic note of alarm; I have heard a bird utter this when sitting on a branch within twenty yards of me.

In their crops I found small fruits, leaves, seeds, and in one instance what appeared to be the spore cases of a moss; there were no leaves or berries of juniper, and the birds were excellent eating. We did not notice the unpleasant flavour mentioned by Hooker, probably because better food is abundant at the season when we shot our birds, and they consequently do not then feed upon pine or juniper.

Tetraonidæ.

817 LERVA NIVICOLA, Hodgs.—I found the snow partridge abundant on the bare slopes of the hills near Yeomatong, at elevations above the limit of bushes. Their habits are admirably described by "Mountaineer" as quoted by Jerdon. They appear to be local in Sikkim. I only saw them at one other locality, near Tangu, and Captain Elwes came across some near the Tankra-lá. They are excellent eating, and by no means tough, if kept for a few days.

TETRAOGALLUS TIBETANUS? Gould.—A species of *Tetraogallus* was shot by Captain Chamer at Phálúng; of one specimen he brought the skin to Darjiling, and gave it to Captain Elwes, who considered it to be the above species. I did not examine it, but the identification is probably correct, since the fauna of Phálúng is quite Tibetan.

The birds seen by Major J. L. Sherwill south of Kinchinjanga, and which he thought were probably *Tetraogallus Himalayensis* (J. A. S. B., 1863, p. 468.) could scarcely have been that species, as he says they closely resembled Pturmagan; and the snow cock is so much larger than Pturmagan that no one who had ever seen the latter could have thought the former resembled it. In all probability the birds seen by Major Sherwill were *Lerva nivicola.*

Order—GRALLÆ.

Scolopacidæ.

879 IBIDORHYNCHUS STRUTHERSII, Vigors.—We met with several of these birds around Yeomatong. Apparently these were one or two families which had bred in this broad portion of the Láchúng valley. They were, for the most part, solitary or in pairs, keeping in the gravel flats or on the turf beside the stream, and rather wary. I found remains of insects, apparently coleoptera, in their stomachs.

The paucity of both waders and ducks in the higher regions of Sikkim, is remarkable. I once saw a snipe at Momay Samdong, which looked larger

than usual, and may have been *Gallinago solitaria.* It appears probable that the majority of the migratory birds which are found in winter on the plains of India pass from Tibet to Hindustan without halting in the Himalayas. The absence of herons and moorhens is surprising.

Order—Anseres.

954 Casarca rutila, (Pallas).—A pair were seen on the lake Bidan, near the Jelep-lá in the Cholá range, and one was shot by Capt. Elwes.

Notes on the Ornithology of Cashmir,—*by* W. E. Brooks, C. E. *Etawah.*

[Received 1st September, 1871.]

A few short notes on some of the birds I met with in Cashmir, last May and June [1871], will probably interest some of the readers of the Asiatic Society's Journal. The first requiring notice is—

Polioaetus humilis, (Schlegel and Müller).—I procured one on the banks of the Tawi river. I also have one from Dhurmsala. A third specimen was killed near Etawah. The measurements of my birds accord with those given by Mr. Wallace in his article in the Ibis for January 1868, "on the Raptorial Birds of the Malay Archipelago." All three specimens have a dark terminal tail band. This was overlooked by Dr. Jerdon who has named this bird *P. plumbeus,* Hodgson ; this and *P. humilis* are identical.

Accipiter virgatus breeds up the Scind valley. The eggs are boldly blotched, like those of *A. nisus.* The eggs of *M. badius* are plain bluish white without spots.

Buteo desertorum.—I procured one at Gulmurg. This is the "*Buteo vulgaris*" of Dr. Jerdon's Birds of India. *B. vulgaris* does not occur in India. *Milvus major,* Hume, is the common kite of Cashmir. It may always be distinguished from *M. Govinda* by the large amount of white on the lower surface of the wing. How this bird differs from *Milvus melanotis,* Temm. and Schl., is a question I should like to see answered.

I took the eggs of the Cashmir kite which resemble those of *M. Govinda,* but are rather larger. The eggs are laid in the latter end of April.

Merops apiaster is common in Cashmir and breeds there.

Coracias garrula is still more common. It nests in holes in trees and in river and other banks.

Coracias Indica.—Only found in the lower ranges south of the Ruttun Pir Mountain ; in fact for the first twenty or thirty miles beyond the Panjab frontier.

Alcedo Bengalensis.—Excessively abundant in Cashmir and breeding there very freely.

Yunx torquilla.—Not unfrequent. Breeds in the large orchard at Ramú.

Certhia Hodgsoni, n. sp.*

The Cashmir creeper is closely affined to *C. familiaris*, but differs in the following respects :—

1. A much longer bill, which is also much lighter coloured.

2. Not nearly so rufous in tone, especially as regards rump and upper tail coverts.

3. The spots on the head and back are very white, and the brown of the upper surface, especially that of the head, is almost black. This gives the Cashmir species a general grey tone, as opposed to the rufous or fulvous tone of the European bird.

4. The English bird has the *three* outer primaries (including the diminutive first) plain brown ; and the *fourth* is marked with a buff patch on the outer web. In the Cashmir bird there are *four* plain primaries, and the *fifth* is marked with the buff patch on outer web. On opening the wings of the two birds, it will be found that the arrangement of the buff and brown of the quill feathers generally differs in position and extent. I have no hesitation whatever in separating the Cashmir species. It has also a lighter coloured bill and lighter feet and claws. It is found sparingly in the pine woods near the snows. It was seen at Gulmurg and also at Sonamurg, where Captain Cock took a few nests. The egg is much more densely spotted than that of the English creeper, so as almost to hide the reddish white ground colour. Size 0·59 to 0·65 long, by 0·48 broad ; time of laying, the *first* week in June.

I give dimensions of the two species :—

	C. Hodgsoni.		*C. familiaris.*	
	Male.	Male.	Male.	
Length of *skin*,	4·8	4·75	4·8	4·85
Wing,	2·54	2·5	2·4	2·42
Tail,	2·5	2·3	2·4	2·4
Bill at front,	·68	·67	·42	·53
Tarsus,	·62	·62	·62	·6
Length of foot including claws,	1·25	1·2		

Mr. Blyth, Ibis for January 1867, identifies a Western Himalayan bird with *familiaris*. I think this specimen will prove to be the present species and not *familiaris*. *C. Himalayana* is found on the south side of the Pir Panjal Mountain, but I did not meet with it in Cashmir proper, where it is replaced by *C. Hodgsoni.*

Sitta Cashmirensis, nov. sp.

In colouration very like *S. Himalayana*, but the Cashmir bird is much larger, with the white on the tail differently distributed. The wing measures 3·3 in. The white of the chin, throat and side of the head is not abruptly defined, but shaded gradually into the rufous of the lower parts. It is very like *S. Europæa*, but is distinct. The abdomen, flanks and lower tail coverts are darker than in *S. Himalayana*. There is no white edging to the under tail coverts as in *Europæa* and *cæsia*. I procured this bird in the pine forests of Cashmir.

Sitta leucopsis.—Captain Cock took the eggs at Sonamurg up the Scind valley. They are like those of *S. Europæa*, but glossier and more delicately marked.

Upupa epops.—Abundant. I took a nest with ten (!) eggs out of a hollow willow at Ramú. The distinctions pointed out by Dr. Jerdon as separating the plains' species from this one do not hold good. The only certain distinction is the depth of the red colour in the Indian bird, which generally has also a vinous tinge. *U. epops* arrives from the north in great numbers in September and October.

Hemichelidon fuliginosa, Hodgson. (*? H. Siberica*, Gml.)

Abundant in the pine woods of Cashmir about 7,000 feet elevation where it breeds. It was especially numerous at Gulmurg. This is the species described in detail by Dr. Stoliczka in his notes on the Ornithology of the Sutlej valley.

I think there can be but little doubt that it is the *Muscicapa fuscedula* of Pallas. Dr. Stoliczka informs me that Gray, in his 'Handlist', I, page 324, unites *M. Siberica*, Gml., *M. fuscedula*, Pallas, and *H. fuliginosa*, Hodgson, giving the two latter names as synonyms only. I am not satisfied that our North-West bird is the original *fuliginosa*, described by Hodgson. The measurements, especially of the wing are much larger; and even a young spotted bird I have, has the wing fully three inches in length. I am also not satisfied that Mr. Hodgson had not two species under the same name, for the dimensions on the back of the drawing of the nest of *H. fuliginosa*, give the wing of two specimens as each three inches in length. The tails are each two inches long. Of this species on another drawing Mr. Hodgson says "*H. fuliginosus*. Uniform sooty brown, darkest on alars and caudals and shaded with white on lower belly, vent and under tail coverts. The body below paler than above. Length $4\frac{5}{8}$ inch; bill to gape $\frac{1}{2}$; tail 2; tarsi to sole $\frac{7}{16}$; central toe and nail rather less; closed wing $2\frac{3}{4}$; legs blackish; bill sooty carneous." It will be observed that Mr. Hodgson does not mention the whitish patch on the front of the neck, nor the bright rufous on the inner webs of the wing feathers. I have had a good many specimens of the North-West species, and find the wing to range from 2·83 to 3·05; and the tail from 1·9 to 2 inches.

I am very strongly of opinion that there are two species closely allied, both being found in Nepal; the larger one ranging from thence to the extreme West and North, even to Siberia, and the shorter winged one extending eastwards. I am borne out in this conviction by both Dr. Jerdon and Mr. Hume. On Mr. Hume shewing Dr. Jerdon his specimens of *H. fuliginosa*, the latter said they were not *fuliginosa*, and that he did not know the bird! In proof of this statement, Dr. Jerdon after a hunt among his box of skins produced at last a singularly broad billed little sooty flycatcher, labelled *H. fuliginosa* in Mr. Blyth's handwriting. This bird I saw. It is smaller; agreeing with Hodgson's measurements, and has an entirely different bill; broader and more convex on the outline, as looked upon from above. The bill is so thoroughly different in shape, that it could not be easily confused with the larger bird. I, therefore, conclude that our bird is not the original *fuliginosa*, as described by Mr. Hodgson. The dimensions on the back of the drawing of the nest above referred to, are in native character only; not by Mr. Hodgson himself, and there is no evidence to show that he confused the two birds. If Mr. Gray is correct in his identifications, our North-West bird should probably stand as *H. Siberica*, Gml., being distinct from *H. fuliginosa*, Hodgson.

Captain Cock found a nest of our bird with three eggs at Sonamurg up the Scind river. It was placed against the side of a tree trunk, and the eggs were of a pale greenish ground colour minutely mottled with pale reddish brown, especially towards the larger end; size of eggs ·65 by ·46 inch.

Siphia leucomelanura.—Not uncommon in Cashmir wherever there are pine woods. As in the case of *Ianthia rufilata*, many pairs of these birds which were breeding had the male in the plumage of the female! Only two pairs which I shot had blue males.

The nest is a neat little cup, placed in a hollow in the side of a tree trunk. The eggs 4 in number are of a pale buff color, clouded with dull pale rufous towards the larger end. Size, ·62 by ·48 inch.

Erythrosterna parva.—Breeds sparingly in Cashmir at from 6 to 7,000 feet elevation. The males in breeding plumage have the red of the breast bordered on each side by a stripe of velvet black. This is not shewn in Dr. Bree's illustration. In winter the black border disappears, nor is it regained before the birds leave the plains of India in March and April. The song is sweet, loud and Robin-like, but short. I failed to find a nest.

Pratincola Indica.—The small black Indian species is the stonechat of Cashmir. It is not an abundant bird anywhere, as it is in Kumaon. The first place in Cashmir where I met with it was at Thunna Mundi, south of the Rultun Pir mountain, at about 4,000 feet elevation. Up to this point *Pratincola caprata* is the very abundant stonechat; extending through all the lower ranges, but not beyond Thunna Mundi, nor did I see it at all

beyond the Pir Panjal range. In Cashmir proper, the only stonechat I observed was *P. Indica,* which extends up to the Scind valley nearly as far as Goond.

IANTHIA RUFILATA.—This bird, like *Siphia leucomelanura,* breeds in the immature or female dress. I shot several pairs which were nesting, and saw others. Only one pair had the male mature, and differing from the female. It nests in holes in bank sides, under tree roots, or fallen tree trunks. The eggs, 4 in number, are bluish white, very faintly marked towards the larger end with the palest reddish brown. Those markings can only be seen upon a close inspection. Length ·74 by ·56 inch.

CALLIOPE PECTORALIS.—Found beyond the Pir Panjal pass, frequenting large beds of broken rock on the grassy hill sides, where they breed. The song is pretty and rather *Accentor*-like.

ACROCEPHALUS BRUNNESCENS.—Breeds abundantly in the Cashmir lakes. The nest is supported, about 18 inches above the water, by three or four reeds; and is a deep cup, composed of grasses and fibres. The eggs are four; very like those of *A. turdoides,* but the markings are more plentiful, and smaller.

ACROCEPHALUS DUMETORUM.—Migrates abundantly through Cis-Himalayan Cashmir in the beginning of May. As I returned in June, I neither heard nor saw one.

ACROCEPHALUS AGRICOLUS.—Near Shupyion I found a finished empty nest of this truly aquatic warbler in a rose-bush which was intergrown with rank nettles. This was in the road side where there was a shallow stream of beautifully clear water. On either side of the road were vast tracts of paddy swamp, in which the natives were busily engaged planting the young rice plants. The nest strongly resembled that of *Curruca garrula.* The male with his throat puffed out was singing on the bush, a loud vigorous pretty song like a Lesser White-throat's, but more varied. I shot the strange songster, on which the female flew from the nest. This was the only pair of these interesting birds that I met with. I think, therefore, that their breeding in Cashmir is not a common occurrence.

DUMETICOLA MAJOR, sp. nov.

Similar to *D. affinis,* Hodgson, but much larger; measuring from 6 inches to 6·3 inches; wing 2·28 to 2·3; tail 2·7; bill at front ·55; from gape ·75 to ·8; tarsus ·87; mid toe and claw ·72; hind toe and claw ·6; tail excessively graduated, the outer feathers being 1·12 in. shorter than the central ones. The bill is long and compressed at the sides; generally quite black, but sometimes dark brown with the lower mandible pale, except towards tip. Legs and feet pale flesh colour, with the claws a trifle darker. Irides dark brown; lores whitish. A cream coloured supercilium. Cheeks

whitish, finely mottled with light brown. Chin, throat and upper breast pure white, finely spotted with dark brown on the breast. These spots are confined to the breast, and in some specimens they are faint or entirely wanting. Centre of belly and abdomen white; sides of breast and flanks shaded with olive brown; under tail coverts pale brown, each feather being broadly bordered with dull white. Whole upper surface dark dull olive brown, the crown of the head being conspicuously the darkest. Primaries, secondaries, and tertials, also wing coverts with the edges of the feathers, rather rufescent. Lining of wing white, with a few small brown markings towards ridge of wing, the tail feathers are obsoletely cross-rayed.

The longer, straighter and stronger bill, and the differently formed wing, with tolerably large 1st primary, separate this bird from true *Locustella.* The upper surface is also devoid of streaks. I obtained several specimens. It ranges from 6,000 feet upwards, even to 10,000 feet elevation, and frequents exclusively places where the ground cover is abundant. It is seldom seen. The song is strictly that of a *Locustella;* similar to that of *L. Rayi,* but slower and louder. By beating the cover where I heard the birds, I was enabled to get an occasional snap shot, and thus secured my specimens. They were all males.

For the sake of comparison, I give Mr. Hodgson's dimensions of 4 specimens of *Dumeticola affinis* as recorded on the drawing of the bird.

Tip of bill to tip of tail,	$5\frac{1}{8}$	$5\frac{1}{8}$	5	5
Bill to gape,	$\frac{9}{16}$	$\frac{9}{16}$	$\frac{9}{16}$	$\frac{9}{8}$
Tail,	2	$2\frac{1}{4}$	2	2
Closed wing,	$2\frac{1}{8}$	$2\frac{3}{16}$	$2\frac{1}{8}$	$2\frac{1}{4}$
Tarsus to sole,	$\frac{7}{8}$	$\frac{13}{16}$	$\frac{13}{16}$	$\frac{7}{8}$
Central toe and nail,	$\frac{3}{4}$	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{11}{16}$
Hind do. do.,	$\frac{9}{16}$	$\frac{9}{16}$	$\frac{9}{16}$	$\frac{9}{16}$

The bill of the Cashmir bird is nearly one quarter of an inch longer. The tail and total length are also much longer.

Horeites brunneifrons, Hodgson.—Occurs sparingly on the south side of the Pir Panjal pass. My specimens agree very well with Mr. Hodgson's drawing. I heard the song of this bird which is very curious and unmusical. Any description of the strange discordant song would be impossible. It sings in a most energetic impassioned manner, and was so engrossed with its own performance, that it did not mind my approach to within four yards.

Horeites pallidus, sp. nov.

A larger bird than the last, but of very similar construction. It is found in dense jungle at lower elevations. Its song is a strange prolonged whistle with a sudden turn at the end, the second strain consists of 5 or 6

notes in a different key; after a short silence, the long whistle is begun again. I have heard more than one visitor to Cashmir call this bird "the whistling bird."

The description is as follows: Length 5·15 inch.; wing 2·2; tail 2·2, bill ·33 and ·5 from gape; tarsus ·9; irides hazel brown; bill light brown; lower mandible paler, except the tip; legs, toes and claws light fleshy brown. Whole upper surface dull greyish olive or rather pale olive grey; a slight tawny tinge on the wings and basal half of tail, on the outer webs of the feathers. Lower back and upper tail coverts rather lighter and brighter in tint than the rest of the back; being more of a pale brown with slight tinge of yellow in it. A dull whitish grey supercilium. Pale brown streak through the eye. Cheeks and ear-coverts brownish white, mottled with pale brown. Chin to abdomen greyish white. Sides of breast, flanks, tibial plumes, and lower tail coverts, pale brownish grey; the flanks being slightly tinged with fulvous, and the lower tail coverts still more so; lining of wing creamy white.

This bird has none of the depth of rich colouring of the *Horornis* group. Its mode of coloration is rather like that of *Acrocephalus dumetorum* in faded summer plumage, but paler and lighter. The tarsi, feet and claws are strong and stout. Tail much graduated, the outer feathers being ·42 shorter than the central ones. In the wing the 5th primary is the longest, and a shade longer than the 6th; 4th a little shorter than 6th; 3rd equal to 8th; 2nd very short, and ·48 short of tip of wing. The rictal bristles are distinct and almost ·22 in. long. The bill has a very faint notch at the end like that of *Horcites brunneifrons.*

PHYLLOSCOPUS MAGNIROSTRIS.—Rather common in parts of Cashmir. It frequents rocky banks of mountain rivers, where they are well wooded. Its song is singularly sweet, but very short. I never found its nest owing to the great difficulty of the ground on account of the excessive steepness. It was most abundant up the Chitterpani from Burrungulla to near the top of the Pir Panjal mountain; also along the banks of the Rembiera river between Aliabad serai and Hirpore. I heard a few singing in the woods about Gulmurg. I may here remark that *P. trochilus* does not occur in India, not even in Cashmir, and may be safely expunged from our lists.

PHYLLOSCOPUS TYTLERI, sp. nov.

In plumage resembling *P. viridanus,* but of a richer and deeper olive; it is entirely without the "whitish wing bar" which is always present in *viridanus,* unless in very abraded plumage. The wing is shorter; so is the tail; but the great difference is in the bill, which is much longer, darker and of a more pointed and slender form in *P. Tytleri.* The song and notes are utterly different; so are the localities frequented. *P. viridanus* is an

inhabitant of brushwood ravines, at 9 and 10,000 feet elevation; while *P. Tytleri* is exclusively a pine forest *Phylloscopus.* In the places frequented by *viridanus* it must build on the ground, or very near it; but our new species builds 40 feet up a pine tree a compact half-domed nest on the side of a fir branch. Eggs pure white. Captain Cock took the only nest obtained, shooting the old bird off the nest. Properly speaking, none of the notes of *P. Tytleri* could be called a song, but the song of *P. viridanus* is not at all a bad one, and quite *Phylloscopine.* I give measurements of the new bird, and also of *P. viridanus* for the sake of comparison. Here let me observe that Colonel Tytler is, properly speaking, the discoverer of this interesting *Phylloscopus;* for four years ago he shot one at Simla which, together with one of my own specimens, I have sent to Dr. Tristram for examination. Col. Tytler had labelled the bird *Sibilatrix affinis;* while *Phylloscopus affinis* stood in his Museum as *Asilus affinis.* As most ornithologists do not recognize the generic distinctions of *Sibilatrix* and *Asilus*, and as *Asilus* has been applied to a genus of insects, I have, with Col. Tytler's permission, altered the name of his bird to *Phylloscopus Tytleri.* The only question remaining is, whether it is distinct from the *Phylloscopi* described by the Russian naturalists. Dr. Tristram identifies *P. viridanus* with *P. Schwarzi,* Radde; but it is possible that he may have compared the Russian specimens with some of *P. Tytleri.* The measurements of my specimens are—

P. Tytleri.

	Length.	Wing.	Tail.	Bill at front.	Bill from nostril.	Tarsus.	
No. 1 ♂	4·75	2·35	1·75	·38	·33	·76	shot off nest by Capt. Cock.
„ 2 ♂		2.27	1·67	·38	·33	·76	Col. Tytler's bird.
„ 3 ♂		2·35	1·83	·35	·3	·75	Cashmir.
„ 4 ♂		2 3	1·7	·36	·31	·7	„
„ 5 ♂		2·2	1·55	·35	·3	·7	„
„ 6 ♂		2·4	1·7	·35	·3	·7	„
„ 7 ♂		3·27	1·72	·37	·32	·75	Almorah.
„ 8 ♀		2 32	1·78	·35	·28	·7	Etawah.

Only one specimen was measured in the flesh, No. 1.

P. viridanus.

	Length.	Wing.	Tail.	Bill at front.	Bill from nostril.	Tarsus.	
No. 1 ♂	5	2·5	2·00	·3	·27	·8	Cashmir,
„ 2 ♂		2·55	2·15	·32	·29	·8	„
„ 3 ♂		2·45	1·9	·32	·29	·7	„
„ 4 ♂		2·57	2·05	·32	·30	·8	„
„ 5 ♂		2·47	1·93	·32	·30	·8	„
„ 6 ♂		2·55	2·00	·3	·28	·76	Etawah.
„ 7 ♂		2·45	2·03	·32	·29	·74	„
„ 8 ♀		2·36	2·08	·32	·28	·75	„

Neither Captain Cock nor I found a nest of *P. viridanus.* I searched hard, for I was anxious to ascertain to what extent the nest and eggs differed from those of *P. Tytleri.*

Phylloscopus affinis,—frequents the same brushwood ravines as *P. viridanus.* The song is very poor and the call note a sparrow-like chirp. I did not find the nest.

Phylloscopus nitidus.—I shot one (about 7th May) in the lower ranges, but I never met with either *P. Indicus* or *P. tristis* in Cashmir.

Reguloides occipitalis.—Is perhaps the commonest bird in Cashmir, even more so than *Passer Indicus.* It is a very noisy bird, with a short poor song. I found several nests which were placed in holes under the roots of trees; one nest was inside a decayed stump. The nest is a loose one of moss, lined with a few hairs. Eggs 4 or 5, and pure white, without any spots.

Reguloides trochiloides.—I shot one in the beginning of May on the Pir Panjal mountain. I never met with it again.

Reguloides superciliosus.—Is very abundant in Cashmir, and I believe in all hills immediately below the snows. It would be vain to look for this bird at elevations below 8,000 feet, or at any distance from the snows. It was common even in the birch woods above the upper line of pines. I found many nests. It builds a globular nest of coarse grass on a bank side; always on the ground, and never up a tree, as stated by Mr. Hume's native informant; the nest is lined with hair in greater or lesser quantities. The eggs, 4 or 5 in number, average ·56 by ·44 inch; are pure white, profusely spotted with red, and sometimes have also a few spots of purple grey. On the 15th of June I found a nest with four young ones in the south side of the Pir Panjal pass. This bird has no song; only a double chirp in addition to its call note. The double chirp which is very loud is intended for a song, for the male bird incessantly repeats it, as he feeds from tree to tree near where the female is sitting upon her nest.

Reguloides proregulus.—Tolerably abundant in the Cashmir pine woods. It has a short twittering song and also a faint shivering sibilant note, like that of *P. sibilatrix;* so that the song ascribed by Mr. Blyth to *Reguloides superciliosus* belonged to the present bird. In addition to these it has its call note.

Captain Cock took the nest and eggs at Sonamurg. It builds, like the golden-crested *Regulus,* up a fir tree at from 6 to 40 feet elevation, on the outer ends of the branches. The nest is of moss, wool and fibres and profusely lined with feathers. Eggs 4 or 5, pure white, profusely spotted with red, and a few spots of purple grey. Size ·53 by ·43.

Curruca affinis.—Tolerably numerous in Cashmir proper, above the elevation of its plain. The song is loud, full, and sweet. The nest and eggs precisely resemble those of *C. garrula,* which bird, I may observe, has no more right to be included in the Indian list, than *Phylloscopus trochilus.*

Motacilla Cashmirensis, sp. nov.

Is quite distinct from *M. Luzoniensis*, Scopoli, with which I compared it. The latter is, as noted by Dr. Jerdon, identical with *M. Hodgsoni*, Blyth, vel *M. alboides*, Hodg. My new bird is coloured very like *M. lugens*, Temm. and Schleg., except that the chin and throat are black. The black extends down the breast for 2¼ inches from base of lower mandible. White portion of face as in *M. personata* of Gould and *M. lugens;* remainder of head and whole of back deep black. All the wing coverts, except a few at upper portion of bend of wing, pure white. All the quills edged with white, the tertials very broadly so; so that when the wing is closed, it looks almost entirely white. I need not notice that the tail is the same as that of all other black and white wagtails. Total length 7·6; wing 3·55; tail 4 inches, bill at front ·5; tarsus ·97. My bird has a grey back in winter, and some of those shot in May were only partly changed. If Mr. Gould's specimens of *M. personata* were not midsummer ones, my bird may prove to be *M. personata*. It nests in holes under large stones in shingle beds of rivers and in accumulations of drift wood. The eggs are like those of *M. alba*, but slightly larger.

Calobates melanope.—Breeds plentifully on the Cashmir streams above 6000 feet elevation. Nest and eggs similar to those of *C. sulphurea.* It is distinguished from the European bird by a very much shorter tail.

Budytes calcaratus, Hodgson.—Plentiful in the Cashmir marshes. Breeds on ploughed land and in broken banks near streams of running water. I could not find the nest. The female has a dark grey and black mottled back, with a black grey crown to the head, supercilium and lower parts yellow. Some females are more grey and without a shade of black.

The males have velvet black backs.

Budytes citreola, Pallas.—Common with the last in the Indian marshes in the cold season, and migrates through Cashmir in May. In June they were entirely gone from Cashmir. This bird never has a black back, but only a crescentic half collar at the back of the lower neck. The back is always grey. The female has not the collar, nor has she a pure yellow head; the top of her head being yellow olive. The supercilium and lower parts yellow, but duller than in the male. She is a smaller bird than the female of the last species.

Budytes cinereocapilla.—Migrates abundantly through Cis-Himalayan Cashmir in the beginning of May. The dimensions of this bird average greater than in *B. flava* and *B. melanocephala;* especially as regards the length of wing. The mature female approaches the male closely in size and brilliancy, which is not the case with the other two species. The mature females of *cinereocapilla* and *flava* are very easily separable both by size and colour; the latter being far from a brilliant bird, which the female

cinereocapilla is. The males of each are notably distinct. All three are abundant in the plains of India in the cold weather. The young grey and white birds of each moult *direct* into mature *flava*, *cinereocapilla* or *melanocephala*, as the case may be, as my large series shews. The voice of *cinereocapilla* differs from that of the other two, and is rather like the note of *B. citreola*. It comes up to Etawah in full plumage, after the other two have migrated north. It is curious that it was the only one of the three that I met with in Cashmir. I shot numbers every time I fell in with a flight, but never procured either of the other species. These three very marked birds have all been confounded under the name of *flava*, which is simply absurd. My series consists of about 600, shot in every month except June, July and August. *B. flava* can always, whether mature or immature, be separated from either of the others by its broad white supercilium. The young of *cinereocapilla* and *melanocephala* are closely alike. They would be difficult to separate until they change some of the head feathers. The supercilium of *B. flava* is occasionally strongly tinged with sulphur yellow, so are the edges of the wing coverts and the margin of the tertials when newly moulted; but this yellow tint wears off, leaving the supercilium quite white. All three are subject to yellow margins to wing feathers.

PIPASTES ARBOREUS.—Migrates abundantly through Cis-Himalayan Cashmir in the end of April and beginning of May. I shot numbers, but never met with a single example of the other very distinct species, *P. maculatus*, which I did not even hear in Cashmir. It has a long drawn sibilant note, never uttered by *P. arboreus*, and its haunts are never strictly arboreal. The general green tinge; the green edgings to the tail; the very pure white on the posterior part of the supercilium, which changes to a deep buff anterior to the eye; and the utterly different mode of striation on the back, separate this bird from *arboreus*. Few people who study the two birds will agree with M. Verreaux that they are one and the same. Mr. Hodgson rightly distinguished them.

ANTHUS ROSASEUS, Hodgson, which has been confounded with *A. cervinus*, is common on the upland grassy hills of the Cashmir Himalayas, where it breeds at and above 10,000 feet elevation. I saw the old birds carrying food to their young on the 15th of June. The song of this species is good, and second only to that of *P. arboreus*, as far as a pipit's song goes.*

* Since I wrote the note on *Anthus rosaceus* I have seen Mr. Swinhoe's paper on the birds of China, from which I make the following extract.

"208. *Anthus cervinus*, Pall., Zoograph. i. p. 511; Ibis, 1870, p. 347; P. Z. S. 1863, p. 273.

Anthus thermophilus, Ibis, 1860, pp. 55, 429; 1861, pp. 36, 411; 1863, p. 311.

Anthus Japonicus, Ibis, 1861, p. 333.

Throughout China, Hainan, Formosa. It is a mistake to identify the European *A. Cecilii*, Audouin (= *A. rufogularis*, Brehm), with our eastern *A. cervinus*.

STURNUS NITENS, Hume.

The "*Sturnus unicolor*" of Jerdon. This is described in the forthcoming work which includes the ornithology of the Yarkand expedition. It is like *S. unicolor*, but smaller with shorter wing and more beautiful reflections. It is excessively abundant in Cashmir at moderate elevations and in the valley, and breeds in holes of trees, and in river banks. The eggs are like those of *S. vulgaris*, but rather smaller. The latter bird occurs plentifully in the plains of India in the cold weather, and is as profusely spotted as English specimens. The bills vary in length, and are not longer as a rule than those of the British birds. I did not meet with *S. vulgaris* in Cashmir. It appears to migrate more to the west, for it is said to be common in Afghanistan. *S. nitens* also occurs in the plains in the cold season. I have Etawah specimens. They are at that time slightly spotted, but can always be very easily distinguished from *S. vulgaris*.

EMBERIZA CIA, E. STEWARTI and E. FUCATA, all breed in Cashmir. The latter bird has the best song of the three.

HESPERIPHONA ICTERIOIDES. Lays a large egg like a hawfinch. It builds in pine trees.

Carpodacus erythrinus and *Carduelis caniceps* had not laid when I left in June. They are numerous in Cashmir. The former, by dissection, would not lay till late in July, I think.

CHRYSOMITRIS SPINOIDES.—Frequent on the south side of the Pir Panjal pass. This bird is not a siskin, but a greenfinch allied to *C. chloris*. It does not possess the merry song of a siskin, nor any siskin like notes. Its song is the characteristic "beez" of a greenfinch. Any one who has heard the song of the English green grosbeak will know what I mean by the "beez." The "beez" of the Indian so-called "Siskin" is, however, far inferior to that of the greenfinch.

METOPONIA PUSILLA.—I saw this bird in flocks at Shupyion in May. The female as well as the male has a red forehead. They breed late.

FRINGILAUDA NEMORICOLA.—Abundant on the grassy upland slopes of the Pir Panjal mountain. It breeds there, as they were paired and singing

Ours is a smaller bird, with shorter wing, and in summer is easily distinguished by the rosy hue of its eyebrow and breast, which in the other are rust-colour, the breast being streaked with black. The streaks on the flanks, too, in the latter are much longer and broader."

From the above note I conclude that there are only two species of red-breasted pipits, and that the following are the synonyms:

1. A. Cecilii, Audouin.
   A. rufogularis, Brehm.
   } The European or Western bird.

and

2. A. cervinus, Pall.
   A. rosaceus, Hodgson.
   A. Japonicus.
   } The Eastern or Asiatic bird.

in June; but I did not find the nest. Their shrill song consists of one or two monotonous notes, frequently repeated from the top of some rock or stone.

ALAUDA GUTTATA, sp. nov.

Is the common skylark of the Cashmir plains. Larger than *A. gulgula*, with a longer wing and tail; not so rufous, and with a far bolder mode of marking on the breast. At each side of the breast, the spots coalesce and form a couple of dark patches like those of *Calandrella brachydactyla.* This is not the case in *A. gulgula.* The white on the outer tail feathers is also of a clean white, as in *Alauda arvensis.* From the latter it is, however, quite distinct. I have several specimens of *arvensis. A. guttata* is, with the exception of the excessively spotted breast, an intermediate bird between *A. arvensis* and *A. gulgula;* with a song, as might be expected, equal to that of either.

Description. Much less rufous than *gulgula* and of a darker and duller brown above. The lower surface is also colder and greyer in tone. Tail much whiter on outer feathers. Breast much more profusely and boldly spotted and with generally a coalition of spots on each side, similar to that of *C. brachydactyla.* Length 6·3 to 6·9; wing 3·7 to 3·9; tail 2·6 to 2·8 inch.

Dr. Jerdon has made great confusion amongst the larks by giving *A. dulcivox*, Hodgs., as a synonym of *A. triborhyncha*, Hodgs. Mr. Hodgson's drawings shew them to be quite distinct. *A. dulcivox* is a very large lark, measuring $7\frac{1}{2}$ inches long; wing $4\frac{1}{4}$; tail $2\frac{13}{16}$. Breast spotted as in *arvensis.* In character it is the only lark which closely approaches *arvensis. A. triborhyncha* is, as far as I can ascertain from Mr. Hodgson's beautifully finished drawing, identical with *A. gulgula;* and so is *Alauda orientalis*, vel *leiopus* of Hodgson.—Dimensions of *triborhyncha*: Length $6\frac{1}{4}$ and $6\frac{1}{8}$; tail $2\frac{1}{8}$ and $2\frac{3}{16}$. The drawing shews the wing of *triborhyncha* to be $3\frac{1}{4}$ inches, and that of *orientalis* to be not quite $3\frac{3}{4}$ inches which is the range the wing of *gulgula* is subject to. The tails also agree with that of *gulgula*, and the coloring agrees exactly.

I am satisfied that the Cashmir bird is distinct; for independently of size it differs by the peculiarly dark grey hue. There is another large lark found up the Scind valley at Sonamurg, which may turn out to be Hodgson's large species *A. dulcivox.* Capt. Cock took several nests of this bird and the eggs are large and well marked, but I regret to say, he did not bring a specimen of the bird itself.*

* I have since received several specimens of *A. dulcivox* from Amritsar and Naoshera, collected by Capt. Marshall and Capt. Cock in the cold season. Length 7·5 to 7·7, wing 4·4 to 4·7 inch. It is a finer and larger lark than *arvensis.*

(*Note*). I have only noticed some of the birds I met with in Cashmir. To have included the whole would have made this paper too long. I should observe in conclusion that *Totanus hypoleucos* breeds plentifully on the Cashmir streams, and *Ibidorhynchus Struthersii* sparingly. Two ducks breed there *A. boschas* and *Fuligula Nyroca*. *Ardetta minuta*, *Ardea cinerea*, *Nycticorax griseus*, *Scolopax rusticola*, *Fulica atra*, *Hydrochelidon Indica* and *Crex Bailloni*, all breed in the Cashmir valley.

Notes on various new or little known Indian Lizards,—*by* Dr. F. Stoliczka.

(With Plates II—V.)

[Received and read 6th September, 1871.]

In continuation of my notes on some *Ophidians*,* I have in the present paper placed on record observations respecting different species of Saurian Reptiles. In obtaining materials for this purpose, I have received constant support from Dr. F. Day, (collecting in the N. W. Provinces and Panjáb), from Major Beddome (Sth. India), Mr. Kurz, (Burma), Mr. Wood-Mason, (Bengal and N. W. Provinces), Mr. Mandelli (at Darjeeling) and Mr. Martin (at Pankabaree). Numerous specimens, thus brought together from almost all parts of India, have enabled me not only to discriminate several imperfectly known species, but also to prove the identity of several others. As far as it appeared practicable, I have supported my descriptions by drawings of the typical specimens.

To indicate briefly the results:—I have noted at length some variations in different species of *Lacertidæ*, and have shewn that little reliance can often be placed in the form and number of the anterior head-shields, a character which is occasionally considered by herpetologists† to be of primary importance in the definition of genera. A complete list of all known Indian and Burmese *Hemidactyli* is given and a few new species described. The genera of the Indian ground *Agamidæ* require serious revision, and a few notes on this subject will be found embodied in the subsequent pages. The *Charasia dorsalis*, recorded some little time ago by Mr. W. T. Blanford from Central India, proves to be a new species. As regards *Stellio* a conspectus is given of the four Indian species at present known. In the *Scinc* family I have discriminated three Indian *Hinuliæ*, *H. indica*, *maculata* and *Dussumieri*, and commented upon various species of *Mocoa*, *Riopa*, *Euprepes*, &c.

* Jour. A. S. B., vol. XL, 1871, p. 421 &c.

† Comp. Dr. J. E. Gray 'Lizards;' Steindachner, Sitz. Akad. Wien, Math. Nat. Klasse, vol. LXII, 1870, p. 336.

In connexion with the descriptive details, (often necessarily tedious), I have noted the geographical distribution of most of the species, as far as I had been able to obtain reliable information.

Fam. *LACERTIDÆ.*

From observations which I made on *Tachydromus*, *Ophiops*, and *Acanthodactylus*, I presume that the form, size and number of shields on the antero-superior part of the head, and also partially the nasal shields are unreliable for generic, and often even for specific, distinctions.

TACHYDROMUS SEXLINEATUS (I. R.,* p. 69.)

I have from the low valleys of Sikkim 25 specimens which I believe to be Daudin's *T. sexlineatus;* they certainly belong to the same species which occurs in Asám and in Burma, those from the latter province having also been referred to the above named species by Dr. Günther; and another specimen of the same species was noted by Blyth from Mergui. (Journ. A. S. B., 1855, xxix, p. 716).

The Sikkim specimens present, however, certain variations which deserve special notice, because they are important as regards comparison with allied forms. The two nasals generally form a distinct suture between rostral and anterior frontal, rarely do these four shields meet in one point. In one specimen the anterior frontal is regularly divided into two shields. The nasal is followed at the hinder inferior edge by a triangular shield, which rests on the posterior upper half of the first upper labial. In two specimens the anterior corner, and in one the upper corner is detached from the inferior postnasal and forms a separate little shield by itself. One specimen has on one side 3, on the other 4 chin-shields, and four specimens have regularly 4 pairs of chin-shields, the two first pairs representing in size exactly, or very nearly, the first pair of such specimens as have only 3 pairs of chin-shields.

There are always 8 longitudinal rows of enlarged scales on the upper side of the neck, separated from the occipitals by only a few smaller scales. Of those 8 rows the outermost on each side has the smallest scales and, although it can generally be traced at the side of the body, it always remains indistinct, somewhat irregular and is occasionally broken up, and the scales never enlarge in size. The other six rows are well marked on the neck and have most probably given rise to the specific name *sexlineatus*. The outer row on each side becomes somewhat obsolete before it reaches the shoulder, while the remaining four rows of enlarged scales continue on the body, and down to the tip of the tail. To these four rows Daudin's name *quadrilineatus* evidently applies.

* The reference 'I. R.' stands for Dr. Günther's 'Reptiles of British India.'

On the lower side of the body I find constantly only six longitudinal rows of scales on the chest between the axils, one ridge connects the axil with the groin at the edge of the belly and above this follow always two, only in very old specimens sometimes three, shorter rows of enlarged keeled scales. Thus there are on the lower half of the circumference of the body, strictly speaking, 12 series of longitudinal rows of enlarged scales, 6 on the lower side of the belly and 3 (rarely 4) on each side of it. Dum. and Bibron correctly refer to the "six series longitudinales" along the lower side of the belly, and besides to the enlarged scales on the flanks, not, however, defining their exact number, most likely because they found them to be variable. Dum. and Bibron's statement cannot, therefore, be attributed to a probable misprint, as suggested by Dr. Günther (l. cit., p. 69).

The coloration and size and proportions of the Sikkim specimens exactly correspond with those of *sexlineatus*. Some have a white iridescent stripe along the edge of the back; others are uniform green above, with a more or less distinct bronze tint. The fore-limb reaches to the rostral and the hind-limb nearly, or exactly to the axil, when laid forward. Of all the specimens examined, there is only one with two inguinal pores on each side, several have 3, but most 4 or 5 pairs, often succeeded by a sixth imperfectly developed one.

What follows from these observations is:

1st.—That the *Tachydromi* cannot be grouped with sufficient reliance, either by the number of chin-shields, or by the number of inguinal pores, as suggested by Dr. Günther, these two characters being evidently very variable within the limits of one species; and that the most important difference must rest in the number and size of the scales of the body, the proportions of the limbs and the general form.

2nd.—That the specific distinction between *T. meridionalis* and *sexlineatus* is not so definite, as it would appear to be from Günther's description of the former species. Both appear to have an indistinct short fold before the shoulder, when adult, but in *meridionalis* there are said to be 2 or 3 more transverse rows of scales between axil and groin, and the limbs would seem to be slightly shorter. Whether these points represent sufficiently characteristic distinctions, can only be shewn by the examination of a larger number of specimens.

3rd.—That *T. Haughtonianus* (Jerdon, Proc. A. Soc. B., Feb. 1870, p. 72) must range with Günther's *septemtrionalis* (and not with *T. Japonicus*), and as the number of chin-shields is not characteristic, the two are evidently closely allied, but in the former the median row of dorsal scales is not smaller than the lateral ones; the fore limb does not reach the rostral shield, when laid forward, nor the hind-limb the axil.

OPHIOPS JERDONI, Blyth.

Blyth in Journ. Asiat. Soc. Bengal, 1853, vol. xxii, p. 653.—Günther I. R., p. 72.
Tropidosaura Jerdoni apud Theobald, Cat. Rept. Asiat Soc., 1868, p. 22.
Pseudophiops Jerdoni et *Theobaldi*,* Jerdon in Proc. A. S. B., Feb. 1870, p. 71 &c.

I have lately received from the neighbourhood of Agra and the country northwards, towards Ambala, about 20 specimens of the form described by Jerdon as *Pseudophiops Theobaldi*. The characters given as distinctive from the only type of *Ophiops Jerdoni* are not constant; therefore, *O. Theobaldi* must be considered as identical with *Jerdoni*, as has already been suggested by Major Beddome (Madras J. Med. Sc., for 1870). Moreover, the genus *Pseudophiops* proves to be perfectly identical with *Ophiops*. Already in the somewhat injured type of *Ophiops Jerdoni* in the Museum there is on one side a distinct groove seen to proceed from behind the nostril and dividing the nasal. In one of Jerdon's specimens of *Theobaldi*, presented to the Indian Museum, the nasal is, as far as it can be traced, in one shield, but in the other it is distinctly between two shields, followed by two postnasals, which is also the usual number in the type of the genus, *Ophiops elegans*, while three postnasals are evidently of much rarer occurrence. In nearly all the specimens which I lately received, the nasal is exactly as in *O. elegans*, between two shields, only few have them anteriorly, and others also posteriorly, entire; therefore the name *Pseudophiops* must be cancelled.

As regards the species, *O. Jerdoni*, I have to record the following variations. As a rule there is one frontal; in one specimen this is obliquely divided into two unequal shields, and in two specimens it is divided regularly along the middle into two halves. The posterior frontals are sometimes in contact with each other, or they are divided by one elongated, linear shield, or by two smaller ones following each other. Each posterior frontal is behind separated from the respective supraorbital by a small shield, but occasionally the latter is united with the frontal. The elongated vertical, the two large supraorbitals, the pair of anterior occipitals forming a suture, and the larger posterior occipitals separated by two unequal shields, following each other, are persistent in all. There are 8 upper and 7 lower labials, the last in each case smallest, and there are 5 or 6 pairs of chin-shields, the last generally followed by two smaller shields. In one specimen the two, rather larger, anterior pairs are in contact, in others, three anterior pairs form a suture. The number of scales round the body is generally 30, sometimes 32, very rarely 34, of these the 6 ventral longitudinal rows are enlarged and smooth, as are also one or two adjoining rows on either side, while all the other scales are very sharply keeled. The fore-leg, when laid forward, very

* Beddome notes the M. S. name *Civittata*, which was evidently suppressed by Dr. Jerdon himself. Comp. Beddome in Mad. Jour. Med. Sc. for 1870.

nearly or exactly reaches the nostril, and the hind limb extends to somewhat beyond the axil, rarely as far as the ear. Some of the largest specimens measure very nearly 5 inches, the body being 1½ inch.

The coloration also is variable; it is usually bronze brown, sometimes with an olive and often a greenish metallic tint. The four white bands, two along the edge of the back and two at the sides, are generally well marked; however, in some specimens the dorso-lateral bands are very indistinct. Again, there are as a rule two series of black dots, separated by reddish brown ones, on the back along each white band, and similar black-spots, almost forming irregular bars, are at the sides between the white bands, and also below the lateral band. In two specimens all these black spots are remarkably small, and in one of a distinct greenish brown coloration they are nearly absent, but the white bands are well marked. This specimen is one of the two which I noticed as possessing a pair of anterior frontals, and very closely corresponds with *Ophiops Beddomei*, Jerdon* (= *monticola* apud Beddome, Mad. Jour. Med. Sc. for 1870).

I collected near Kandala, on the Western Ghâts, a specimen which agrees in every point with Beddome's description of *monticola*. It has the uniform greenish brown coloration with the dorso-lateral white stripes very indistinct, but the lateral ones well defined; there is a pair of anterior frontals present, and the femoral pores are more widely separated in the preanal region, than in any of the specimens of true *O. Jerdoni* which I examined. Considering the variations which I have noticed in undoubtedly identical specimens of *O. Jerdoni*, I cannot but doubt that *O. Beddomei* (= *monticola*) will prove a really good species. However, more specimens must yet be examined, in order to settle this point.

Gymnops microlepis, Blanf.

Blanford, Jour. Asiat. Soc. B., 1870, xxxix, p. 351, pl. xv, figs. 1—5.

A few specimens of this species, which was described from a single specimen from the Central Provinces, were collected by me at the coal mines of Kurhurbali, W. Bengal.† One specimen has 5, the other 6, pairs of chin-shields, the last pair in each case followed by a smaller shield. In other respects of structure of shields and scales, proportions of body and coloration the specimens perfectly agree with Blanford's description, except that the number of scales in one transverse row between the 6 longitudinal enlarged rows on the belly, and counted across the back, is generally 56-64 instead of about 50; but this is evidently a character which may be expected to vary with the size of the lizard. There is a good deal of variation in the number and distinctness of the dark spots accompanying the white bands; in some specimens the former nearly become obsolete. The tail is reddish in young specimens,

* Jerdon, in Proc. Asiat. Soc., Feb. 1870, p. 72.

† I found it since abundant in Katch.

and the lower side of adults often with a distinct yellow tinge, particularly on the lower side of the thighs. One of the largest specimens measures 5¼, another 5⅓ inches.

Gymnops is distinguished from all known species of *Ophiops* by the peculiar small size of smooth scales, being almost granular on the neck; they altogether resemble those of *Eremias*. It further differs from *Ophiops* by having one instead of two postnasals, this is, however, a character not of great generic value, as already observed by Mr. Blanford, when suggesting the separation of the present species into a special genus or subgenus.

ACANTHODACTYLUS CANTORIS (I. R., p. 73).

I received numerous specimens of this species from the neighbourhood of Agra, Ambala and Lúdiana, together with *Ophiops Jerdoni*, both of which have also been found associated by Dr. Jerdon (Proc. A. S. B., Feb. 1870, p. 71) in the country a little westward in the Panjáb.

The specimens measure between 4 and 9 inches, the length of the body being 1⅓ to 2¾ inch. When young they are usually marked with 8 longitudinal black stripes, separated by white ones of equal width. Four of these stripes are on the upper side of the body, the two inner coalescing into one before they reach the middle of the back, while the two outer unite on the anterior part of the tail. One dark band runs on the upper edge of the sides of the body, and one connects the ear with the groin. In more adult specimens the dark bands become gradually less distinct and are first dissolved into spots, until they gradually quite disappear; and the same is more or less the case with the white bands and other spots. The general colour changes from brownish to pearly grey, and there is always a more or less distinct purplish irridescent lustre traceable on the scales. This is particularly clearly seen in the more uniform coloured adult specimens, which often shew an indistinct reticulation of a dull reddish tinge on the upper side of the neck and back. Limbs above white spotted, top and sides of head dark spotted or marbled; the dark spots disappearing with age; below uniform white or greenish white. I have to note three points in which nearly all the specimens I examined differ from the type described by Dr. Günther:—

1st.—There are always 3 or 4 scales at the front edge of the opening of the ear, slightly projecting into its space, unless the edge be accidentally turned inwards.

2nd.—There are very often 14 longitudinal, along the median dorsal line convergent, rows of enlarged, keeled scales across the middle of the back, and the adjoining 2 or 3 rows on either side are equally large, but beyond this the size considerably diminishes. Across the middle of the belly there are 14-16 enlarged smooth scales, 10 being in a row on the flat lower surface of the belly, and the remainder at the side of it.

3rd.—The fore limb, when laid forward, at least reaches the nasal shield and more often the tip of the snout;* and the hind limb extends rarely only to the collar, usually somewhat beyond it, and occasionally as far as the tympanum.

None of these points indicate, I believe, a specific distinction from typical *A. Cantoris*, as described by Günther. Some of my specimens agree in every point of size with the measurements given by Günther; the largest is 9 inches.

Of other variations may be noted:—the anterior frontal is, as a rule, single, sometimes split into two unequal portions, and in one instance it is represented by a regular pair of equal shields. The posterior frontals generally form a suture, but sometimes they are partially or even entirely separated by an intercalated shorter, or longer, or by two, shields. The posterior supraciliaries are often broken up into two shields. The form and number of vertical and occipitals is persistent. The large shield below the orbit sometimes rests on two or on three labials, and occasionally it touches the labial margin itself.

Fam. GECKOTIDÆ.

Gecko guttatus (I. R. p. 102).

The young of this, and indeed of most other species† of Geckoes, are dark, or blackish brown, with white spots. Few small spots are on the hinder part of the head, while on the body they are larger and generally arranged in 7 irregular cross series, the first series being placed immediately behind the occiput and the last between the hind limbs; tail blackish with 7 white rings, the last occupying the tip.

The general structure is exactly as in the old, but the tubercles are much flatter; there are (in several specimens) only 34 longitudinal series in the middle of the belly, while in old ones the number rises to 50.

Ptychozoon homalocephalum.

I. R., p. 105 and Journal A. S. B., xxxix, p. 159.

This species occurs both at the Nicobar and Andaman islands.

* Günther says it only reaches 'the front edge of the orbit,' but he gives the fore limb 11 lines, which is exactly the distance between the axil and the nasal shield in all my specimens measuring 7 inches.

† It is, therefore, very probable that the specimen of *Gecko Smithii*, Gray, which I noticed on p. 161 of Jour. A. S. B., 1870, Vol. xxxix, has still the coloration of the young, and may lose most of the white spots, when adult. Dr. Anderson when re-describing the same in Proc. Zool. Soc. for 1871, p. 159, subsequent to the publication of my paper, omitted to notice the identity of the specimen, which it is necessary to do, because a misprint occurred in my statement (l. cit. on p. 162) as regards the total measurement, this being 4·8 inches (instead of 5·8 inches), but the other detailed measurements are correct.

HEMIDACTYLUS.

I have observed in several hundreds of specimens of different species of *Hemidactylus*, (as restricted, and of the section *Doryura*), as well as in the allied genera *Peripia* and *Nycteridium*, that the total absence, or the presence, of a few enlarged tubercles does not constitute a sufficiently distinct specific character. The variations in this respect cannot be accounted for either by age, sex, or the locality, but they are simply accidental. The species belonging to the section *Doryura* have generally a nearly uniformly granular body, well developed paratoid glands and normally a smooth tail, while in *Hemidactylus* the tail is normally spiny, but, when reproduced, it becomes smooth.

The distribution of the Indian and Burmese species of *Hemidactylus* is the following:

1. H. TRIEDRUS, Daud. (I. R., p. 107). Ceylon, South and Central India (Bundelcund).*

Nothing reliable is as yet known about the form for which Jerdon suggested the name *H. subtriedrus* (Jour. A. S. B., Vol. xxii, p. 467). (see pl. ii, fig., 1†).

It is perhaps not specifically different from *triedrus*, but there certainly exist some forms which possess the distinctive characters noted by Jerdon of his *subtriedrus*. Mr. W. T. Blanford kindly allowed me to examine two specimens which he lately collected near Ellore, and which, although agreeing in form, general structure and coloration with *triedrus* (for instance the figure in Belanger's Voyage), differ somewhat from the description usually given of that species. The two specimens are both females, apparently not full grown, and measuring on the average 4½ inches, of which the head is about ¾ inches, and rump 1½ inch. None of the tubercles on the back is as large as the opening of the ear; the head does not appear to be shorter than in typical *triedrus*, but the scales on muzzle and throat are certainly very small; a great number of moderately enlarged tubercles on the hinder part of the head; two enlarged shields behind the rostral separated by two small azygous shields; nostril situated between rostral, suprarostral, first labial and two moderate shields behind; 10 to 12 upper labials, not constant, a row of conspicuously enlarged scales above them; 10 very distinct and well developed lower labials; 2 pairs of chin-shields, first forms a suture; 32 long rows of scales across the middle of the belly. The coloration, which was noted by Mr. Blanford during life is: body generally bluish grey with 5 olive brown, black-edged bands on the body and about 6 on the tail; of the former the first is situated on the neck, 2nd on the shoulder and the last be-

* Proc. A. S. B. for 1870, p. 74.

† Side and lower views of head; natural size.

tween the hind limbs. The band on the neck is darkest. The edges of all are darker and more irregularly undulating in front than behind; a yellow black edged band passes from the nostril to the eye, slightly continuing behind, the lower black margin is the more distinct one and continues through the ear to the cross band on the neck, with the anterior black margin of which it is confluent; upper half of orbit and some spots below eye yellow; head pale, uniform; tubercles on back yellowish, those on the edges of all the blackish bands and at the sides of the belly more distinctly so, brightest on neck; limbs unspotted; below yellowish, all scales minutely punctated. In spirit the whole of the yellow coloration has turned pure white and the dark bands are now white edged.

2. H. MACULATUS, D. and B.

(Günther, I. R., p. 107.—Stoliczka in J. A. S. B., vol. xxxix, p. 164, and Blanford, ibidem, p. 361.

3. H. PIERESI, Kelaart, (= *H. Sykesi*, Günther, I. R., p. 108).

It is, I think, clear that Dum. and Bibron, when describing their *H. maculatus*, had under examination the two forms which Günther separated, and for one of which (considered as the young by D. and B.) he retained Dum. and Bibron's name. The two forms are, no doubt, extremely closely allied, and it has yet to be satisfactorily proved, whether *H. Pieresi* should more appropriately be considered as a large local variety of *maculatus*, or as a distinct species, but, I believe, the view taken by Kelaart and Günther, and first of all by Gray, is the correct one. It is certain that *maculatus*, as restricted by Günther, never appears to attain on the continent of India and Burma a larger size than 5½ inches, and this measurement was observed only in two cases among about 200 specimens from South India, Central India, N. W. Provinces, the Sub Himalayan hills, and almost all parts of Bengal, Burma and the Andamans. The usual size is 4 or 4½ inches.

In all these specimens the head and body is brown spotted, the spots on the latter have a tendency rather to arrange themselves in longitudinal than in cross series; in the three median rows the spots are larger and more distinct than at the sides, where they generally become rather confluent. The brown spots are equally distinct, or equally indistinct, in males and females, the variations apparently depending upon the seclusion of the locality in which the lizards live. However, I have repeatedly observed, that in specimens which had the tail reproduced, the brown spots do not retain the same distinctness which they had before. South Indian specimens are generally of dark hue, and often have some of the enlarged tubercles white. Young specimens are always dark brown, with still darker spots, while the majority of the enlarged tubercles is purely white.

As regards structure I find the enlarged tubercles slightly vary. They are always well marked, along the back distinctly trihedral, on the sides often more

rounded; they are arranged, as a rule, in 16 to 20 alternating, longitudinal, but not very regular rows; they are slightly larger and sharper in adult males than in females. The enlarged scales on the middle of the belly somewhat extend to the sides and are usually in 38 or 40 longitudinal series. The femoral pores in the male are 10-14 on either side, very rarely united in the preanal region; as a rule, they are separated by 1 or 3 or 5 scales; if 3 intermediate scales are present, which is very often the case, they are arranged in a triangle.

The specimen recorded by Theobald in Cat. Rept. Asiat. Soc., p. 30, under the name "*H. fasciatus*, Gray (?)" is *H. maculatus;* the former having been described from an unknown locality must, therefore, provisionally remain under that doubtful head, and not be added to the Indian fauna.

The four specimens in the Museum from Ceylon, recorded by Theobald in Cat. Rept. Asiat. Soc. p. 30, No. 41, as *H. maculatus*, belong to the larger form; two of them have the body about 3⅜ inches and in one the tail is 3⅝, giving a total measurement of nearly 7 inches. In structure of scales, tubercles and shields, the specimens do not exhibit any important difference from *maculatus*, as usually understood, though at the first sight they appear quite distinct. The two other specimens equal in size typical *maculatus*, but when closely compared with specimens of this species, they evidently possess a certain aspect of immaturity and tenderness of the skin, &c.; their heads are proportionately larger, and the same is the case with the trihedral tubercles, which are present in a slightly smaller number (14-16 rows); their colour is almost uniform whitish. In the two adults, the differences are still more marked, and the brown marbling has an inclination to form transversely arranged bands, very similar to a specimen described by Günther under the name of *H. Sykesi.** The number of femoral pores is 32-36, in a slightly interrupted series. For this Ceylonese form, Kelaart proposed the name *H. Pieresi* (Prod. Faunæ Ceyl. 1852, p. 159), and as far as can be seen from the drawing of *H. Sykesi* (in Günther's Reptiles), the latter does not in any way differ from the former, therefore, Kelaart's older name must take priority. It also seems to me clear that Dum. and Bibron's largest specimen of *maculatus*, of which they give measurements, is the *Sykesi* of Günther; it is said to occur in the neighbourhood of Bombay, wherefrom Dum. and Bibron received it. Dr. Gray is evidently the original observer of the two forms, the small *maculatus* and the large *Pieresi*, as shewn by him in his 'Lizards' p. 153, where he gives "*H. Sykesi*, Gray, B. M." as the synonym of *maculatus;* and among the specimens of that species he quotes "*a.* In spirits. Female? India, Dukun. Presented by Col. Sykes." This is to all appearance the only type of Günther's species, bearing the name *H. Sykesi*.

* Of Gray?

Kelaart (Prod. Faunæ Ceyl., 1852, p. 158) also gives *H. Sykesi*, Gray, as the synonym of his doubtful *maculatus*. The history of the species appears to have been overlooked by Dr. Günther.

H. maculatus, as restricted, occurs in Ceylon, throughout India, Burma and the Malayan Peninsula extending to Sumatra, Java, &c. Peters in Van der Decken's Reisen gives it also from the Seychelles. It is a very common species in houses about Calcutta.

H. Pieresi is as yet known only from Ceylon and from the Dakhin (Dekan).

4. H. GRACILIS.—A very beautiful species described by W. T. Blanford from Berar and Raipur in Central India (Journ. A. S. B., Vol. xxxix p. 362, pl. xvi, figs. 4-6).

5. H. RETICULATUS, Beddome. Madras J. Med. Sc., 1870, p. 33.

6. H. FRENATUS, Schlegel, (I. R., p. 168).

Hem. sublævis, Gray, apud Theobald, Cat. Rept. Asiat. Soc., p. 30.
H. frenatus, in Journ. A. S. Beng., vol. xxxix, p. 164.
? *H. punctatus*, Jordon, 1853, Journ. A. S. B., xxii, p. 467.

This species which usually grows to about 5 inches, (rarely attaining $5\frac{1}{2}$) is readily recognised from all other Indian *Hemidactyli* by the small size of the thumb and inner toe; the claw on it is setiform and often so fine as to be hardly traceable. The body is finely granular, but there are always some enlarged rounded tubercles present. In Bengal specimens, two alternate series of those very usually run along the centre of the back, and there are besides about 3 irregular rows on each side of the body. Dakhin (Dekan) and Upper India specimens generally have no enlarged tubercles in the middle of the back. The tail is spiny, unless it has been reproduced, in which case it remains smooth. The femoral pores are either interrupted by one enlarged scale, or they are continuous above the preanal region. The colour is very variable,—uniform grey, or greenish grey, very closely marbled and spotted with dark; or grey with some irregular stripes and close marblings, the former most distinctly marked on the neck and the sides of the belly; or dark brown with some irregular blackish stripes; there is, however, always a more or less distinct pale (during life sometimes yellowish orange) band present, passing from the rostral through the eye and either disappearing above the ear, or continuing along the side of the body down to the groin; this pale band is margined above and below by a dark line. The tail has sometimes an orange tinge, particularly after the cuticle had been shed.

H. frenatus is the commonest Gecko from Ceylon and through India, extending in a northwesterly direction as far as the Panjáb, and occurring all through Bengal, Burma and the whole of the Malayan Archipelago, includ-

ing the Andamans and Nicobars. From all these parts I have examined specimens. It occurs in houses as well as on trees, and among stones. According to Peters it is also found at the Seychelles.

I am strongly disposed to believe that Jerdon's *H. punctatus* was based upon a young female specimen of *frenatus*. I possess specimens which in every point of colouration, and structure and measurement, agree with Jerdon's description, the only apparent discrepancy lying in Jerdon's statement to the effect that "the thumb appears as well developed as in *maculatus*." In some respects this is really the case, the basal portion of the thumb being in the two species nearly equally developed, occasionally almost more so in *frenatus*, but the free claw bearing portion of the thumb is always somewhat shorter in *frenatus* than in *maculatus*.

7. H. Leschenaulti, D. and B.

Günther, I. R., p. 109.—*Idem*, Jerdon, J. A. S. B., xxii, p. 468.—*H. Coctæi*, apud Kelaart, Prod. F. Ceyl., 1852, p. 160,—*H. Kelaartii* and *Leschenaultii*, Theobald, Cat. Rept. Asiat. Soc. Mus., p. 29 and 30.—*H. marmoratus*, Blf., Jour. As. Soc. Bengal, vol. xxxix, part ii, p. 363, pl. xvi, figs. 1-3.—*H. marmoratus*, *Kelaarti* and *Leschenaultii*, Blanford in Proc. A. S. B. for August, 1871, p. 173.

The present species generally has, like the previous one, some enlarged, rounded tubercles on the back, at least on the femoral region, more rarely are the tubercles scattered over the entire body. The colour is rarely uniform silvery grey, generally there are some transverse, zigzag dark marblings traceable, and there is usually a dark band through the eye present; 10-16 femoral pores on each side, widely separated in the preanal region.

The species can readily be distinguished from *frenatus* by the well developed thumb, and from *Coctæi* by the greater number of femoral pores, somewhat less widely separated in the preanal region. Kelaart's *Coctæi* is evidently this species, and was named *Kelaarti* by Theobald, as pointed out by Mr. Blanford, who formerly separated a small Central Indian variety, with a nearly uniform granulation, as *H. marmoratus*.

H. Leschenaultii occurs in Ceylon, whence some years ago specimens have been identified by Professor Peters* and Dr. Steindachner; it is common all through South India according to Jerdon and in Central India according to Blanford. I have obtained a few specimens on the Parisnath hill and near Ranigunj in Bengal, and others from near Patna and Agra. It is not known from North-Eastern Bengal, and thus may be regarded as a true *Indian* species.

8. H. Mortoni, Theobald, Journ. Linn. S., Zool. X, p. 32. Close to *frenatus*, but having the thumb and inner toe well developed.—Burma.

* Berlin Akad. Monatsb. 1860, p. 183.

9. H. Coctæi* (I. R., p. 109).

Theobald, Cat. Rept. As. Soc. Mus. 1868, p. 29.
Steindachner, Novara Rept., Pt. I, p. 13.
H. Bengaliensis, Anderson, Journ. A. S. B., vol. xl, p. 14.

This is the most common species all through Bengal, whence it was originally described by Dum. and Bibron. The thumb is well developed, as noted by the French authors and by Cantor, but the claw small, as observed by Dr. Günther, who identified *Bolt. sublævis*, Gray, with the present species. The back is generally equally granular; sometimes there are a few larger rounded tubercles present on the sacral region, more rarely also on the sides of the back, the variations being in this respect exactly similar to those noticed in *H. Leschenaultii*. The larger tubercle on the side of the neck, stated by Dr. Anderson to distinguish *Bengaliensis* from *Coctæi* is quite as often present as it is absent. Tail, when original, segmented, with one or two large elongate scale-like lateral tubercles near the base, and 2 to 3 smaller ones on the upper sides, but as a rule none along the middle; subcaudals enlarged. On reproduced portions of the tail, there are sometimes a few large scales present at the lateral edges, but more commonly the tail remains quite smooth. I have never seen, even in the largest specimens, more than 8 femoral pores in each row, they being widely separated in the preanal region; the usual number of pores is six in each row, rarely less.

During life, the general colour is greenish grey, with 5 transverse, broad undulating greenish brown bands, the first on the neck, the fifth on the loin, and all edged with white posteriorly; the tail is similarly banded above, and the white edgings are often more conspicuous; a pale band through the eye on the side of the head, margined with dark above and below, and generally becoming obsolete on the neck. The iris is reddish golden, pupil narrow, black with undulating edges. The animal changes its coloration very rapidly during life, sometimes the transverse bands turn almost to blackish brown, and another time they become quite obsolete. In spirits the brown tints partially, and in time entirely, fade. Below white, most of the scales generally very minutely punctated with black. Old specimens, particularly the females, have the tail at the base often very bulging, depressed, and nearly three-fourths of an inch broad.

I have not seen specimens of this species from farther southwards than Orissa, but it is very numerous in Western Bengal, extending through the North West Provinces up to the foot of the hills at Kangra and Hurdwar, westward into the Panjáb and eastward into the lower parts of Sikkim, the Khasi hills, Cachar and the whole of the Gangetic delta. I did not obtain it in Burma, but two specimens have been sent to me stated to have been procured in Pegu. Dum. and Bibron record it from Bombay, which very

* ? Is the right name *Cocteaui*?

likely refers to some locality in the Western Ghâts. Jerdon does not quote it from South India and Kelaart's Ceylon *Coctæi* is *Leschenaultii.* Cantor (Mal. Rep., J. A. S. B., xvi, p. 629) gives it as occurring in Penang, and notes a specimen 7 inches long, the head above being 1¼ inches, which is a somewhat unusual size.

In general structure and coloration, *H. Coctæi* is very closely allied to *Leschenaultii*, differing from the latter by the smaller number of femoral pores, and somewhat more elongated and narrower fingers and toes, with more numerous and thinner plates below, the toes being in *Leschenaultii* more broadly oval, shorter and the plates below coarser; the thumb also is somewhat shorter. Judging from the known geographical distribution, it appears to me very probable that *H. Coctæi* replaces in the Gangetic delta *H. Leschenaultii*, which is a more southern form; and both appear to meet together in Western Bengal and the southern part of the N. W. Provinces.

In Calcutta this is the largest *Hemidactylus*, usually seen on the outer walls of houses or godowns. It is readily known by its coloration. The usual size is 6-7 inches, the body being 3-3¼ inches, while the tail is often reproduced. On one occasion I obtained two specimens, each of nearly 9 inches, the body being 3½, and the tail (perfect) a little above 5 inches.

10. H. AURANTIACUS, Beddome, Madras J. Med. Sc., No. 1, 1870, p. 33.

A uniformly granular species, without any enlarged chin-shields. Shevaroys and Anamallays, South India.

11. HEMIDACTYLUS GIGANTEUS, n. sp. Pl. II. fig. 2.

Pl. II, fig. 2, 2 a, 2 b, top, side, and lower views of head, 2 c, inside view of the sacral region and right foot; all figures in natural size.

General form very similar to that of *H. Coctæi.* Head and body above uniformly granular, the scales on the snout being, as usually, slightly larger, and sharper, and those on the hinder part of the head smallest; two enlarged shields behind the rostral, separated by one or two minute scales, nostril situated between the rostral, the suprarostral and a semicircular shield behind, on the lower side in contact with the rostral, excluding the first labial from entering the nostril, 14-17 upper and 11-13 lower labials; two pairs of chin-shields, the first in contact, anteriorly partially separated by the pantagonal inferior rostral; the second chin-shield about half the size of the first, slightly elongate or rounded and followed by a few smaller scales along the labials; scales on belly slightly hexagonally elongate, in 40 to 44 longitudinal series; some on the pubic region are pointedly elongate, but none are particularly enlarged; in the males 18-20 femoral pores on either side of the thigh, separated in the preanal region by an interspace of about 7 scales width; tail indistinctly segmented, generally reproduced and then without any

segments, rather abruptly tapering, occasionally very bulging near the base, uniform scaly above and at the sides without any enlarged spiny tubercles; subcaudals moderately enlarged, beginning to be so a short distance from the anus; about 11 transverse lamellæ on the first, and 14-15 on the fourth toes, the two or three basal lamellæ and the terminal one being in each case simple; thumb well developed.

This species is very closely allied to *H. Coctæi*, and I might have considered it as a gigantic variety of the same, had it not the peculiarity of the first labial being excluded from the edge of the nostril, which is a character constant in all the specimens, none of them also have any enlarged spiny scales at the side of the tail; but the most important distinction lies in the presence of a large number of femoral pores, which are also somewhat less widely separated in the preanal region, than they are in *H. Coctæi.*

The general colour during life is, according to Mr. Blanford, olive grey to blackish olive, with irregular dark, pale edged marks in imperfect circles, inclined to form 4 or 5 transverse undulating bands on the body. In spirit these irregular markings are slightly traceable, and the whole body is besides rather finely mottled with brownish olive. Below uniform white.

Hab. I have examined 9 specimens which were kindly lent to me for description by Mr. W. T. Blanford, who obtained the same in a solitary locality on the Godávári river near Badráchalam, on trees. The body of the smallest measures $4\frac{1}{4}$ inch., and of the largest a little above 5 inches. All have their tails partially reproduced, and the longest is only about $4\frac{1}{2}$ inches, in its original state it must have been at least 6 or 7 inches. In one of the largest specimens, the length of the head is $1\frac{3}{8}$ inches, and the width at the occiput $1\frac{1}{8}$ inches.

12. H. [Doryura] Berdmorei, (Blyth). Pl. II, fig. 3.

Leiurus Berdmorei, Blyth, Journ. A. S. B., 1853, xxii, p. 646.

Doryura Berdmorei, apud Theobald, Journ. Linn. S., Zool. x, p. 29.

Pl. ii, fig. 3, upper view of a male specimen, 3*a* and 3*b*, side and lower views of head, 3*c* sacral region with a part of the tail; all figures in natural size.

Body and tail covered with small, equal, granular scales, those on the snout being somewhat coarser; tail depressed, rounded at the sides, contracted at the base, indistinctly segmented; numerous small scales behind the rostral and the nostril; 10 to 12 upper, and 9-10 lower labials; two pairs of chin-shields, the first large, separated above by the rostral, below forming a suture, those of second pair barely half the size, and each forming a suture with the respective anterior chin-shields and the second labial; there is usually a row of slightly enlarged scales along the lower labials, while those on the throat are very minute, almost granular, and greatly contrasting with the

larger scales on the abdomen; ear opening rather small, rounded; a moderately developed gland on each side in the place of the paratoids, generally more distinctly seen above than below; thumb small, well developed, with a minute claw; about 38 long. rows of scales across the middle of the belly, extending somewhat on the sides; 14-16 femoral pores in each series, separated by a width of about 3 scales in the preanal region; a row of transversely enlarged shields along the middle of the lower side of the tail.

Grey or light brown, slightly mottled with dark brown and four longitudinal series of blackish spots interrupted by white ones; two of the series originate on the superciliary region and two in continuation of a blackish streak, originating at the lower half of the eye; head above and labials black spotted; tail also with dark transverse spots above; below uniform white, with the shields of the belly generally very minutely punctated. The brown series of spots are not in all specimens equally distinct, and sometimes they are almost obsolete. Specimens which have shrunk much in spirit shew, like all other *Geckos*, a fold on the side of the body, and the tail becomes also slightly angular at the sides.

Blyth's original description of the coloration of this species is decidedly better, than the supposed improved one by Theobald. The type specimen came from Mergui; Theobald found it common in Pegu; I have received it from the Khasi hills, and collected a great number of specimens about Pankabari, just above the Sikkim Terrai, mostly on the outside walls of houses; one specimen was also sent to me by Mr. A. W. Lawder from Almorah, in Kamaon.

The largest specimen from Pankabari measures 4½ inches, of which the body is 2⅛ inch.

13. Hemidactylus [Doryura] Mandellianus, n. sp. Pl. iii, figs. 1—2.

Pl. iii. fig. 1, upper view of a full grown specimen; 2, 2 a, 2 b, 2 c, different views of the head and sacral region of another specimen; all figures in natural size.

Body and tail depressed, covered with numerous small rounded tubercles, there being in old specimens generally a few larger ones perceptible at the side of the body and on the sacral region; snout elongate, depressed, with the scales larger than on the body; tail depressed, gradually tapering to a point, moderately convex above, somewhat flattened below, indistinctly segmented, laterally sharply keeled and serrated, the tubercles at the end of each segment being white and more prominent than others. There is a pair of somewhat enlarged shields behind the rostral, separated by a slightly smaller shield; the nostril lies between the rostral, the 1st labial, the supra-nasal and two moderately enlarged post-nasals; 12—14 upper, and 10—12 lower labials, the last in each case, as usually, very small; 2 pairs of enlarged chin-shields, the first forms with the lower halves a suture below the

inferior rostral, the second is smaller, generally only half the size of the first, each shield rounded, placed immediately below its respective first chin-shield, but separated from the second lower labial by a smaller shield; a row of slightly enlarged shields adjoining the lower labials; scales on the throat very small, flattened, those on the belly much larger and roundly hexagonal, and in about 36 longitudinal, alternating series; a median row of transversely enlarged subcaudals. The ear opening is moderate, rounded; the glands in the place of the paratoids very large, occupying almost the whole of the side of the neck; toes elongate, united with a short web at the base, provided with rather coarse lamellæ, there being 9 or 10 pairs of them on the fourth toe; nearly the first half of the lamellæ on all the toes is either undivided or only slightly grooved; thumb well developed, with a minute claw. Out of 10 specimens examined of various sizes none had femoral pores, but the scales in the preanal region are conspicuously enlarged in all.

Grey, more or less densely marbled and punctated with blackish brown and spotted with pale white. Generally the brown colour is arranged in 6 or 8 longitudinal stripes, more distinctly regular in young than in old specimens, and these stripes are separated by irregular, alternate rows of white spots; limbs, and tail at the base above, also white spotted, upper labials brown; paratoids yellowish brown; lower side uniform white, most of the scales very minutely punctated.

Hab. I have obtained a few specimens at Pankabari, just above the Sikkim Terai, and Mr. Mandelli sent me several from the Rungnu and Tístá valleys, where the species occurs between 1,000 and 3,000 feet. The body of the largest measures 2¼, tail 3, = 5¼ inches. As nearly half of the plates below the toes are undivided, the species forms a connecting link between the section *Doryura* and those small species of *Geckos* which are represented by *G. Swinhoenis*, and are mostly peculiar to Southern China, Japan and adjacent islands.

14. HEM. [DORYURA] GAUDAMA,—from Tonghú in Burma.

Theobald, Journ. Linn. S., Zool. x, p. 30.

Unless authentic specimens are received, it will be difficult to identify this species from Theobald's description. It appears to be somewhat allied to *H. Mandellianus*, but the edges of the tail are said to be in the former minutely "denticulate with an obsolete marginal spine;" "sides" of body "keeled" and "femoral pores nineteen on each thigh," &c. "Grey with no definite markings." Body equal to tail.

15. HEM. [DORYURA] KARENORUM, Theob. (*ibidem*), from Tonghú, Burma.

"Back granular, regularly shagreened with about twenty longitudinal rows of small whitish tubercles," &c.

PERIPIA, Gray (I. R., p. 110.)

Peripia might, like *Doryura*, be considered as a subgenus of *Hemidactylus*. It connects *Doryura* with *Nycteridium*, having the general form and usually flattened pointed tail and small equal granular scales of the former, while the toes are distinctly webbed at the base, and there is also a distinct expansion of the skin at the hinder side of the femora and tibiæ. In *Nycteridium* only the lateral expansion of the skin of the body is added to the character of *Peripia*. If we characterize the later genus from the two Indian species, *P. Peronii* and *Cantoris*, we cannot say that the thumb and inner toe are without an ungual phalanx. I have examined very numerous specimens of the former, and a few of the latter species, and I find that the ungual phalanx on the thumb is very nearly, but never entirely obsolete, it, however, always appears to be clawless. On the inner toe the ungual phalanx is extremely small, but in nearly all my fresh specimens I find there is a very minute, thin, transparent, setiform claw present; only in some old specimens I have not been able to detect it.

P. Cantoris occurs in Penang, Burma, the Andamans and Nicobars; from all the localities I have examined specimens.

P. Peronii is very common on Penang,* and in the Wellesley Province, rarer in Burma and on the Andamans. The type was from Mauritius, and according to Kelaart† it is also found in Ceylon. Andamanese specimens agree in their very distinct brown tinge with those from the two later islands, while Penang specimens are brown, when young, but when adult usually greenish ashy, rarely with a rosy tinge. Two adult fresh specimens from the Andamans perfectly agree in structure with those from other places; the general colour above is pale chocolate brown with a rosy tinge, all over speckled with darker brown and with numerous round white spots, about ½ m.m. in diameter; below white, pinkish towards the sides, and all scales minutely punctated.

NYCTERIDIUM PLATYURUS, Schneider.

1792. *Stellio platyurus*, Schneider, Spec. Physiol. Amph., ii, p. 30, and Denk. Acad. München for 1811, p. 62, pl. i, fig. 3.

1802. *Lacerta Schneideriana*, Shaw, Zool., III, 278.

1864. *Nycteridium*‡ *Schneiderianum*, apud Günther, I. R., p. 111.

1870. *N. Himalayanum*, Anderson, J. A. S. B., vol. xl, p. 15.

I have Asám, as well as Himalayan (from near Darjíling) specimens for comparison, and they certainly belong to the same species. They also do

* Comp. Journ. A. S. B., vol. xxxix, p. 163.

† Prod. Faun. Zeyl. p. 187.

‡ Gray's name *Platyurus* certainly has the same derivation, as *Platurus*, and as it has been at an early date replaced by *Nycteridium*, it seems advisable not to revive the former name, particularly as it would involve a change in the specific denomination, and may besides lead to misunderstanding.

not differ in any essential point of structure from the description given by Günther, who has evidently seen specimens from various parts of the Malay Archipelago, from Ceylon, and also from Asám and Bengal, considering them all to be identical. The same conclusion has been arrived at by Dum. and Bibron in comparing Bengal and Javanese specimens. The Darjiling specimen described by Anderson as *N. Himalayanum* must have had accidentally a somewhat "flatter and more rounded" snout, as in four specimens from the same locality the outline exactly agrees with that of Dum. and Bibron's figure; I also cannot trace any stronger webbing between the fingers and toes, said to distinguish *Himalayanum* from *platyurus.* Darjiling specimens agree admirably with Schneider's original figure, (in which only the head at its base is shewn too broad); the proportion and form of the feet and their toes is exactly the same, the latter being contracted at their bases, connected by a membrane* and provided with 5—7 transverse, divided lamellæ. Schneider says there are 56 large subcaudals, and this is exactly the number I count in a full-grown specimen, with the tail perfect, and not reproduced. The femoral pores (16—20 on either side) are slightly interrupted in the middle of the preanal region. The only difference consists in the shortness of the first pair of chin-shields, but this cannot be more than an individual distinction, if really correctly drawn. The glands which are situated behind the ear, chiefly towards the lower surface of the head, are quite as often absent as present. Out of four Darjiling specimens they are very distinct in an old female, in one nearly full grown male they are small, and in two somewhat younger specimens of opposite sexes they are not at all developed. One of the principal distinctions of the specimen, named by Dr. Anderson *N. Himalayanum*, might be sought in the presence of some enlarged tubercles on the side of the body. A ♂ specimen from the Naga hills (Asám) has no enlarged tubercles; of the four Darjiling specimens one full grown ♀, and one half grown ♂, each have a distinct row of slightly enlarged tubercles at the side of the body, above the attachment of the lateral dermal expansion. One nearly full grown ♂ has an enlarged tubercle on one side and two on the other, just a little in front of the sacral region; the fourth specimen, a female, has the scales uniform granular. It will be seen from these observations that no specific value can be attached to the total absence, or occasional presence, of a few enlarged tubercles, as I had already occasion to notice in different species of *Hemidactylus.*

What is, however, very marked in all Asamese and Himalayan specimens, as compared with the usual descriptions of *platyurus*, is the large amount of dark coloration they possess. The general colour is olive, with a slight bluish cinereous tinge; the whole upper surface is densely variegated

* Which is clearly shewn on the right hind foot between the 1st and 2nd and 2nd and 3rd toes.

and streaked with blackish brown, intermixed with some pale spots, particularly on the limbs; tail with dark brown and alternate irregular white spots. Some specimens have a kind of indistinct transverse, dark bands, one on neck, one on the sacral region and three on the back, they are separated respectively from each other, as in Schneider's figure, by three confluent white spots, placed in a triangle, with the point directed backwards; the three series of spots on the back are the most distinct. A whitish, or pale orange, band runs through the eye, indistinctly continuing on the side of the body; it is margined below by a blackish band, most distinct and broadest at the side of the head. Lower side of body and tail uniform whitish, the scales very often finely punctated.

Cyrtodactylus rubidus, (Blyth).

Comp. Journ. A. S. B., vol. xxxix, p. 165.

This species occurs on the Andaman, as well as on the Nicobar, islands.

Cyrtodactylus affinis, Stol.

Stoliczka in Journ. A. S. B., xxxix, p. 167, pl. x, fig. 1.

The young of this species is reddish brown with some darker brown marks on the upper side of the body, and a series of rather large white spots along the middle of the back. Penang.

Gymnodactylus Lawderanus, n. sp.

Pl. II, fig. 4, side view of the animal, nat. size; 4a lower side of head and 4b, sacral region, both twice the natural size.

Body rather slender and elongate, depressed, covered above with numerous small roundish tubercles, between which larger ones of a similar shape, but of about double the size of the former, are intermixed. Upper side of head equally granular, the granular scales being somewhat larger on the snout. Rostral large, broad, reaching well on to the upper surface of the snout; it is followed by 5 small granular scales. The nostril is situated somewhat laterally in the angle between the rostral, first upper labial, one small scale above and another similar one posteriorly. There are 9 upper, and 8 lower labials, the last three in each case very much smaller than the preceding ones. The lower rostral is triangular, partially wedged in between two elongated chin-shields, forming a suture below it. Each of the chin-shields is followed along the labials by 3 other somewhat rounded shields, none of which are in contact. Opening of the ear small, rounded. Scales on the chin small, equal, rounded; on the belly slightly elongated, and in about 32 longitudinal series across the middle; on the tail, which, however, appears to have been twice reproduced, the scales are also elongate, slightly smaller above than below, but not transversely enlarged, and without any enlarged spines at the sides. The fore limb reaches to the snout, and the hind limb very nearly to the axil, when laid forward. The 3rd and 4th fingers and toes

respectively are perfectly equal, and close together. All the claws are well developed, lying between enlarged scales, at the sides and above, but they are not retractile. A few slightly enlarged scales above the anus, superseded by two pairs of pores, close together, and forming an angle.

General colour above greyish brown, very densely marbled and spotted with dark brown, with some indistinct, undulating, whitish cross bands on the body, margined on the anterior edges with blackish brown; a somewhat indistinct dark band from the nostril through the eye to the ear; front and hind edges of the eye white; labials spotted and speckled with brown; below whitish.

Length of body nearly two inches; tail imperfect, only about one inch long, slightly swollen at the base.

Hab.—The single specimen from which the above description is taken was sent to me by Mr. W. A. Lawder, District Engineer of Kamaon; it was obtained in the neighbourhood of Almorah.

Cantor says, when speaking of *Gymnod. pulchellus* (Journ. Asiat. Soc. Bengal, 1847, vol. xvi, p. 633) that there are two new *Gymnodactyli* preserved in the Museum of the Asiatic Society, one marked *P. lunatus*, Blyth, based upon one specimen from Midnapore and two from Chaibassa,* the other, a nondescript species from Almorah, *Gymnodactylus nebulosus*, Blyth, MSS., allied to *Cyrtodactylus marmoratus*, Gray. I am not acquainted with any further notice as to the second species indicated, nor have I been able to find the specimen itself among the Society's collections; it is also not mentioned in Theobald's Catalogue. Under these circumstances it is of course impossible to accept the suggested name for the present species, particularly also as Major Beddome described already a quite distinct species from near Vizagapatam under the name *G. nebulosus* (Madras Journ. Med. Sc., for 1870).

I may also at this opportunity mention that Beddome's name *G. maculatus*, published in the same Journal, must be replaced by another one, there having been a *G. maculatus* described by Steindachner already in 1866 (Novara Rept. p. 16). A similar change is required with regard to Beddome's *Gymn. marmoratus* (M. J. M. Sc., 1870, p. 31), there having been a species described under the same name by Dum. and Bibron already in 1836 (Herp. Gén., III, p. 426).

Fam. AGAMIDÆ.

Japalura variegata, Gray.

Günther, Rept. of India, p. 133.
Anderson, Proc. Zool. Soc. Lond., 1871, p. 164.

This species has the power of greatly changing its colour. In some specimens (irrespective of sex) the irridescent green bands, in others the metallic or

* These are to all appearance the two *Eubleph. Hardwickii*, mentioned by Theobald on p. 32 of Cat. Rept. Asiat. Soc. Mus.

reddish brown ones, are prevalent, the green is during life much mixed with yellow or white, and the width of the bands and spots themselves is very variable during life; a bluish tinge is often seen on the neck and on the sides of the body of male specimens. The end of the gular sac in the male is deep blue, (not black). The male also has the lower labials generally bluish brown, the upper often bright yellowish white, sometimes, however, both are reddish or pale brown. Numerous brown streaks radiate from the eye, one of these directed towards the tympanoid region is about twice as broad as any of the others; sometimes it is divided by a median line in two, but very rarely it is indistinct. In the females the contrasts between the colours is always less, they very often have uniform greenish and pale reddish tints prevalent. The larger scales occasionally form a distinct row on each side of the back, which thus becomes apparently tricarinate, as in the form noticed by Jerdon under the specific name *microlepis*. (See Proc. Asiat. Soc., Feb. 1870, p. 76).

Very common in Sikkim from elevations of 1,000 up to 9,000 feet. It is, strictly speaking, a ground lizard, hunting between stones and low bushes, but also takes refuge on a tree. It appears to be more common on higher than on lower elevations, but those living between 9,000 and 5,000 seem to reach the largest size.

I was somewhat surprised in reading Dr. Anderson's results (loc. cit.) of the examination of 21 specimens "of all ages and both sexes, from one locality," that is, the neighbourhood of Darjiling. Dr. Anderson arrived at the conclusion that Jerdon's *microlepis* is the female, and Jerdon's *planidorsata* the young of *variegata*. Now as I have* not only observed hundreds of living specimens of *Japalura variegata* in Sikkim, but have also collected and examined them, I may be allowed to say a few words on this subject.

I find *1st*, that the males of *variegata* often are smaller than the females, or at any rate that the latter generally grow to a larger size than the former; *2nd*, that the males have the enlarged scales on the back and particularly the spiny ones on the sides of the occiput comparatively larger and more numerous than the females, the difference being most marked in full grown specimens and in the breeding season, but I have collected male and female specimens in which the scales were nearly equally largely developed, and there is no apparent difference in the size of the smaller scales between the two sexes; *3rd*, that the nuchal and dorsal crest in the male is, especially on the neck, comparatively higher than in the female, and that it generally is on either side accompanied by a series of somewhat enlarged, closely set scales, more conspicuous in smaller than in larger specimens, but they are not equally distinct in the female; *4th*, that the colours in both sexes are similar and equally variable, but always brighter and more variegated in the male, particularly the green and yellow; *5th*, that in young

* And so undoubtedly had Dr. Jerdon.

male and female specimens of *variegata*, the bodies of which vary between one and a half, and two inches in length, there is a similar, simple, continuous nuchal and dorsal crest present, as in the adults, with the usual respective difference in size noted as regards the two sexes.

These observations, on undoubted *J. variegata* "of all ages and both sexes," do not exactly agree with those recorded by Dr. Anderson. They do not exclude the possibility that *J. microlepis* might have been suggested for a specimen of *variegata* with accidentally somewhat smaller scales, but as I do not remember having seen Jerdon's type specimen, and at the same time I know, how very often Dr. Jerdon must have seen *J. variegata* in all its stages, I would defer the identification for the present. As regards *planidorsata* I have no hesitation in saying that Dr. Anderson is mistaken. I well remember Jerdon's two type specimens; they did not appear to be very young and were in beautiful preservation. Among the great number of specimens of *variegata* in the Indian Museum, which Dr. Anderson had been good enough to shew me, I could find none which would correspond with Jerdon's briefly indicated distinctive characters of *planidorsata*.

Sitana Ponticeriana,* Cuv.

Sitana minor, Günther, I. R., p, 135.

The smaller form described by Günther as *Sit. minor*, and noticed by Blanford in Journ. A. S. B., xxxix, Pt. II, p. 365, also occurs in Western Bengal at the Parisnáth hill, and on the Sone river in Bihár, extending northwards through the North-West Provinces as far as Rurkí, near the base of the Himalayas, westwards into the Panjáb, Kattiawar and Katch, but it is not known from any part of Bengal East of the Ganges.

Colour: pale or darker brown above and at the sides, a dark band between the eyes; snout and occiput irregularly spotted and variegated with paler brown; 5 or 6 quadrangular spots on the back, followed by a few smaller ones on the tail; a pale yellowish line along the centre of back is generally present, and the edges of the back are also pale; a yellowish band on each side from below the eye through the ear to the groin, in full grown specimens only well marked at the sides of the neck. All these pale or yellowish bands, as well as some of the large scales at the side, and particularly the front side and the hind base of the femora, and the transverse pale bands on the limbs, have a very marked fleshy or rosy tinge, most distinct in full grown males. The pouch is tinged with blue and red in the males only during the breeding season, at other times it is slightly blue, but a blue line always continues from it along the chin to the lower rostral. The labials are often blackish. Below, yellowish white.

* Dr. Anderson informs me that he believes this form to be specifically distinct from true *Ponticeriana*, differing from the latter by the intermixed larger scales &c.

The enlarged scales on the back, and especially at the sides of the body, are invariably well marked, but less numerous in female than in male specimens; they are during life yellow or golden, and during the breeding season often tinged rosy, or even vermilion. In Northern India the species does not appear to attain the size which it does in Central India, for none of the specimens from the former country are above 5½ inches, the tail being generally more than twice the length of the body. The claws on fingers and toes are always black. The tympanum is usually covered by a yellowish hardened shield.

Jerdon (Proc. Asiat. Soc. Beng., Feb. 1870, p. 76) is, I think, correct in retaining the name *Ponticeriana*, for the smaller *Sitana* with long limbs, but I doubt that the larger form, for which he proposes the name *Deccanensis*, is really specifically distinct from *Ponticeriana*. I collected hundreds of them, in all sizes from 3 to 8 inches; they are all of the same type, as those I received from Ceylon and from South India, and I find the fore limb scarcely ever reaches the vent, while the hind-limb extends usually beyond the snout, except in a few full grown specimens.

Charasia, Oriocalotes and Oriotiaris.

The name *Charasia* has been proposed by Gray (Lizards Brit. Mus., 1845, p. 246) for the South Indian species, *Ch. dorsalis*, as type. I have examined numerous well preserved specimens of this and of another species inhabiting the greater portion of Central, and perhaps also of Northern, India, and this induces me to propose a somewhat different definition of the genus.

Char. Body elongate, somewhat depressed, covered with imbricate, or subimbricate, keeled scales, between which some slightly larger ones are intermixed, the scales being arranged in more or less indistinct transverse series; those on the lower side are often less distinctly keeled than those on the back; tympanum naked; a small tubercular spine at the posterior end of the supraciliary edge; some spines above the tympanum; nuchal and dorsal crest present, but low; (generally) a fold across the throat; scales on the tail subimbricate, not arranged in regular cross series; (no distinct gular sac, no femoral, or preanal pores).

Charasia must be classed next to *Trapelus*, to which it is very nearly allied.

Hab.—Terrestrial, generally found between blocks of gneissose rocks.

The distinctive points in the structure of *Charasia* are:—1st. the presence of a small tubercular spine on the hinder supraciliary edge; 2nd, the presence of some slightly larger scales intermixed between the smaller ones at the side of the body. It is true that these larger scales are very difficult to trace in *Ch. dorsalis*, but I have observed them in various young and old specimens. Were it not that they are, as a rule, better developed

in the allied new species, presently to be described, I would attach hardly any significance to these enlarged scales, but the variability of this character will be important in a comparison with other allied genera; 3rd, the ventral scales are in young specimens of *Ch. dorsalis* distinctly keeled, and even in old ones the keels are generally traceable on the breast and in front of the anus. A peculiar character of the type species, *Ch. dorsalis*, consists in the very small scales of the body, but this character loses its value by the other species, *Ch. Blanfordana*, having all the scales comparatively much larger.

If, after this brief explanation, we compare with the above noted characteristics of *Charasia* those of *Oriocalotes*, as recorded by Günther, (I. R., p. 146), we find that there is no essential distinction between the two. According to the description of the species, the body of *Oriocalotes minor* would seem to be less depressed, and there is besides a shoulderfold noticed, but I doubt that these characters can be looked upon as generic differences; they are certainly not regarded as such in the genus *Calotes.* The type species described by Günther, *O. minor*, is from Sikkim, but I have unfortunately never met with it. The only other species, *O. major*, noted by Jerdon from the Sutlej valley, (Proc. Asiat. Soc., Beng. 1870, p. 77) I consider intermediate between *O. minor* and *Charasia Blanfordana.*

There also appears to be very little difference between *Charasia* and *Acanthosaura*, and I think it doubtful that the species of the latter are arboreal in their habits; however, I have never observed them alive.

A third form is Günther's *Oriotiaris* (I. R., p. 150). The only known species, *O. tricarinata*, was often observed by me in Sikkim; it is like *Charasia* a ground lizard. The sole important difference from the latter genus, and the so-called *Oriocalotes*, consists in the absence of a shoulder or gular fold, a character which I do not consider to possess generic value. I believe, therefore, that *Charasia, Oriocalotes*, and most probably also *Oriotiaris* should form only one genus, to which *Acanthosaura* is very closely allied, if at all distinct. The three former are certainly ground lizards, as are also *Japalura, Agama, Stellio*, while *Calotes* is often not much more arboreal than terrestrial, *Bronchocele* is chiefly, and *Tiaris* entirely, arboreal.

Charasia Blanfordana, n. sp.

Charasia dorsalis, Gray, apud Blanford, Journ. Asiat. Soc. B., 1870, vol. xxxix, p. 368.
Pl. III, fig. 5 and 5a. Upper and side views of the head, natural size.

Head elongately ovate, or subtrigonal, considerably shorter and blunter in young than in old specimens, with the paratoids very much swollen in the adult male. Head covered with small, subequal, carinated scales, those at the sharp edge of the canthus rostralis and above the eyes somewhat larger than others. Nasal shield large, swollen, single, the opening directed laterally upwards; a minute spine, or a tubercle, at the posterior end of the superciliary edge; two spines above the tympanum, one situated on the occiput and the

other somewhat posterior, but close to the tympanal edge. In size the tympanum very nearly equals the eye. A longitudinal series of about 7 or 8 enlarged scales below the eye. There are generally 10 or 11 flat upper, and 12 or 13, somewhat more convex, lower labials, both squarish, except the last which are much elongated. Lower rostral posteriorly much elongated, followed on each side by a row of 4—6 enlarged scales, separated by smaller ones from the lower labials.

All the scales of the head, body and tail above and below are imbricate, being arranged in somewhat indistinct cross series, and all are keeled. In young specimens the keels below are very distinct, in older ones they often become less marked, but except in the middle of the belly never entirely obsolete. At the sides the scales are intermixed with a few slightly larger ones, the latter being in younger specimens generally easily seen, but in adults they are more difficult to trace. There are 80—100 longitudinal rows of scales round the middle of the body. The scales on the tail are larger than those of the body, and again those along the upper median line exceed the adjoining somewhat in size. A distinct, though low, nuchal and dorsal crest is present in both sexes, disappearing on the tail; it is more developed in the male than in the female.

The fore leg reaches to the groin when laid backward. The hind leg generally reaches to the front edge of the eye, when laid foreward; in some few very old specimens it only reaches to the posterior edge.

Young specimens are olive brown above, marbled and spotted with dark brown, with two dark cross bands on the upper snout, and one connecting the middle of the supraciliary edges. Along the middle of the back there are usually some enlarged, lozenge-shaped, brown spots. The sides are speckled with white, orange or red, this colour being generally confined to the enlarged scales. A brown band proceeds from the eye to the shoulder, margined below by a more or less distinct white band. The tail is encircled with brown and alternate whitish bands, generally interrupted on the lower side which is uniform dingy white. Full grown females retain the same colouration as the young, except that the series of lozenge-shaped spots on the back is more distinct, but males vary enormously in colour, exactly as in *Charasia dorsalis.* The lateral black streak on the neck is always distinct, but the entire head and anterior part of the body above and below become brilliant scarlet, or more often zinnabár red, while the posterior part is nearly entirely black; all the colours, however, change very rapidly after death.

The largest specimen measures 12 inches, of which the body is very nearly 4 inches.

Although closely allied to the South Indian *Charasia dorsalis*, the present form is fairly separable by its comparatively longer limbs, larger, more distinctly imbricated and stronger keeled scales, which are present round the

middle of the body in a considerably smaller number, there being 130-140 series of squarish scales in *Charasia dorsalis*, while there are only 80-100 sub-imbricate ones in *Blanfordana.* Also, the nuchal crest is much better developed in the latter than in the former species.

Ch. Blanfordana is given by Mr. Blanford from a large number of localities in Central India. I found it not uncommon on the gneissose rocks composing the Parisnáth hill, in Western Bengal; it is a true rock lizard, as noted by Mr. Blanford, who describes (loc. cit.) its habits at some length.

It is also very likely the species noticed by Blyth on one or two occasions from Birbhúm, and also, I think, from the Panjáb, under the name of *Ch. dorsalis.* Anderson in Proc. Zool. Soc. Lond., 1871, p. 168, repeated Blanford's incorrect identification of the present species, without, however, acknowledging the source he took it from.

Charasia (*Oriotiaris*) tricarinata, Blyth.

This species was originally described by Blyth as *Calotes tricarinatus* (J. A. S. B., xxxi, p. 650), and afterwards by Günther as *Tiaris Elliotti*, subsequently made the type of a distinct genus under the name *Oriotiaris;* (Rept. of India, p. 150, and Jerdon in Proc. A. S. B., Feb. 1870, p. 77, and Anderson, in Proc. Zool. Soc., 1871, p. 167.

I have already noted the great similarity of the generic characters of this species to typical *Charasia.*

Blyth's name '*tricarinatus*' refers to the presence of three keels on the anterior part of the body, there being besides the median crest a row of larger scales on each side of it, disappearing towards the middle of the body, but becoming again better traceable on the femoral region. The large spiny tubercles* above the tympanum are always multicarinate on the upper side, and often bluish during life. The colour of the live lizard is generally bright grass green above, with the angular series of larger scales (directed backwards) often chocolate brown; the lateral keels on the neck are yellowish, sometimes margined with a dark line below. The sides of the body are either entirely green, with only two brown streaks above and below from the eye, or the sides of the head, tympanoid region, neck and anterior part of belly, are deep chocolate brown. There are, however, always some light yellow or whitish spots on the labials, and generally a yellowish streak at the base of the neck on each side. Lower side yellowish white. In spirit the green colours gradually change to more or less distinct brown.

As noticed by Jerdon, the species is by no means common about Darjíling; I found it between 3000 and 8000 feet, generally about large stones in sunny places on the scarp of the road. The largest specimen does not exceed 7 inches.

CALOTES ELLIOTTI, Günther.

Günther I. R., p. 142.—Jerdon, J. A. S. B., xxii, p. 471, and Proc. A. S. B. for 1870, p. 77.

I collected this species at Matheran,* near Bombay. It is quite distinct from *Rouxii*. The shoulder-fold is bluish black. It seems to be quite as much terrestrial, as arboreal in its habit. The small scales of the body (about 56 round the middle of it), and the little spine behind each superciliary edge strongly recall *Charasia*. Some of the scales at the side of the body are yellow, but they are not apparently larger than others. *Colour*—pale brown, bright red on the head and about the shoulders, rest of upper side with indistinct dark stripes; lips and the knees dark; claws above black; throat reddish, tinged with bluish; rest of under-side white. The fore limb reaches to the groin, when laid backward, and the hind limb to the anterior edge of the eye, when laid forward.

In one specimen the head and body are 2½, and the tail 5½, = 8 inches.

STELLIO, Daudin (I. R., p. 157).

Four species of this genus can be distinguished in India, all appear to inhabit the Himalayas, or the country close to the base of the hills.

1. *St. Dayanus*, n. sp. Scales of the back moderate, smaller but continuous on the neck; enlarged scales at the side numerous. Hardwár.

2. *St. tuberculatus*, Gray. Scales of the back small, very much smaller or granular on neck; enlarged scales at the sides scattered, generally few, or nearly all obsolete. Southern slopes of the Himalayas.

3. *St. melanurus*, Blyth (comp. Proc. A. S. B., Sept. 1871, p. 189). Enlarged scales of the back unequal, those composing a few median rows considerably larger than others on either side. Panjáb and Kashmir.

4. *St. Himalayanus*, Steindachner, (Novara Rept., Pt. I, 1867, p. 22). Enlarged scales of the back smooth; Ladak, Northern Indus valley.

I shall note in greater detail the two first mentioned species, as they are closely allied to each other, while the two remaining are so entirely distinct that there can be no mistake about them.

STELLIO DAYANUS, n. sp.

Pl. III, fig. 4. Upper view of the anterior part of the body.

Head depressed, covered with small sharply keeled shields, irregular in form, slightly larger on the canthus rostralis and becoming gradually imbricate on the hind occiput; nostril in the hinder part of an elongate swollen shield, narrow in front, but usually separated from the rostral, as well as from the first labial, by a separate shield; a ridge of somewhat larger scales origi-

* Günther refers, I suppose, to the present species when noticing *C. Rouxi* from Matheran (Proc. Zool. Soc., 1869, p. 501).

nates a short distance behind the nostril, and passes below the eye in a slight ascending curve to the upper edge of the tympanum; 10—12 upper and as many lower labials; a short ridge of spiny scales is in continuation of the upper labials directed towards the lower edge of the tympanum, but separated from it by a tubercular group of spines; tympanum slightly smaller than the eye, with a group of spines in front of it; numerous groups or irregular short ridges of enlarged spiny scales at the side of the neck, the skin on it being rather loose. Lower rostral sharply pointed behind; first pair of chinshields large and nearly touching below the rostral; one or two rows of enlarged scales follows on either side along the labials, separated from them by one or two rows of smaller scales. The throat fold extends laterally in front of the shoulder, where only a small naked pit of soft skin exists. Enlarged dorsal scales moderate, sharply keeled, in about 13 longitudinal series in the centre of the back; they are considerably smaller, but distinctly continuous on the neck and up to the occiput; nuchal crest small, composed of separate, sharply keeled, compressed scales; numerous enlarged, almost spiny, scales at the side of the body interspersed between the smaller ones; scales on the upper side of the limbs larger than those of the body; on chin small, subtubercular, very sharply keeled; on breast and belly indistinctly keeled or nearly smooth, often with a patch of enlarged, hardened, scales in the centre of the belly, where they are arranged in about 40 longitunal series. Each thickened scale in the preanal patch is soft or spongy in the middle, and evidently secretes a similar fluid, as do the preanal and femoral pores of other lizards. Scales on the tail irregular at the base, but farther on arranged in verticils; their size is equal to those on the upper side of the feet.

The fore-limb when laid backward fully reaches the groin, but more often extends a little further on the sacral region, the fourth finger is a trifle longer than the third; the hind leg, when laid forward, sometimes reaches the snout, but usually only the front edge of the eye; the fourth toe is longer than the third by its claw.

General colour, in young, above and at the sides pale olive, variegated and spotted with black and yellowish white; throat reticulated with dusky blackish; rest of lower side white. Adults are throughout brownish or blackish, or with some indistinct darker spots along the back; head uniform, much paler; body above all over densely spotted with yellow, throughout reticulated with bluish, and there is, in adult male specimens always, some blue tinged with red, on the chest, on the sides of the head, neck, and of the belly, most strongly marked in the breeding season; sometimes the entire throat is purplish blue; lower side of body and of tail yellowish white; terminal two-thirds of tail blackish.

Hab.—I have received some 40 specimens from Dr. Day, who collect-

ed them at Hardwár, where the Ganges leaves the hills for the plains. They measure from 4 to 18 inches, in all stages of growth, the tail when perfect is fully ⅔ of the total length. I find that in former years I also obtained this species at Misouri, and on the road from Kalka to Simla, having noticed the difference of the scales on the neck and back, as compared with those of the next species, but unfortunately I have no specimens by me now.

STELLIO TUBERCULATUS, (Gray), (I. R., p. 157).

Pl. III, fig. 3. Upper view of the anterior part of the body.

This well known species is readily distinguished from the last by the much smaller size of the enlarged scales on the back, which are in from 13 to 17 longitudinal series in the middle of it; on the middle of the neck the scales are not at all enlarged, but there is a low, often minute, nuchal crest present. The structure of the head-shields is in both species very similar, but they are always less distinctly keeled in *St. tuberculatus*, sometimes nearly, and above the eyes always, smooth; the enlarged row of scales below the eye is well marked; the nasal sometimes touches the rostral and first labial, but more generally it is separated from them by smaller shields; the enlarged spiny scales on the side of the neck are less prominent in this, than in the former species; the scales of the belly are proportionately smaller, in 48—54 transverse series; the enlarged scales at the sides are generally few, occasionally arranged in transverse rows, but sometimes they are nearly entirely absent; rarely, in male specimens, are these spines nearly as numerous and irregularly distributed, as in the former species. The patch of enlarged callous scales on the middle of the belly is much more often present, than in *Dayanus*. The fore-limb, when laid backward, generally does not reach the groin, but occasionally it does so; the hind-limb, when laid forward, usually reaches the tympanum, sometimes the eye, rarely the front edge of the eye, but I have not seen one specimen in which it extends to the rostral shield. The largest specimen I measured is 13½ inches, of which the body is very nearly 5, and the tail 8½ inches. On the whole, both the limbs and the tail are somewhat shorter in the present species than in the former.

There is also a difference in coloration. Young and adult specimens are above on body and limbs of a dark olive brown or almost blackish colour, with numerous darker spots in the young, indistinct in the adult, and intermixed with yellowish spots, these being fewer, but often larger than in *Dayanus;* occasionally they are entirely absent. The head in the adult is above cinereous olive, spotted black and yellowish at the side; in front of the shoulder, on the breast, and also at the sides of the body, there are often numerous bright yellow or orange spots present. Lower side uniform dull white in young, generally spotted with dusky on the throat. In adults the throat becomes

more or less spotted and tinged with reddish blue, extending partially on the chest, and in adult males the whole of the under side, including the lower side of the limbs, is bluish black, brightest and strongly tinged with purple on the throat, the same tinge extending on the neck, the shoulders and sides of the belly. An adult male is really a gorgeously coloured lizard. The usual habitat is between large rocks on bare or open slopes of hills.

Hab.—I have received numerous specimens of this species from Kamaon (near Almorah) through Mr. A. W. Lawder; from Kangra and Dalhousie through Dr. Day, and from Marí through Mr. A. B. Wynne. About Simla, in Kulu, all through Chamba, Kishtwár and in Kashmir, I have in former years collected this species largely, it ranges up to 12,000 feet, and if the Spiti form is the same species, I have observed it up to nearly 14,000 feet.

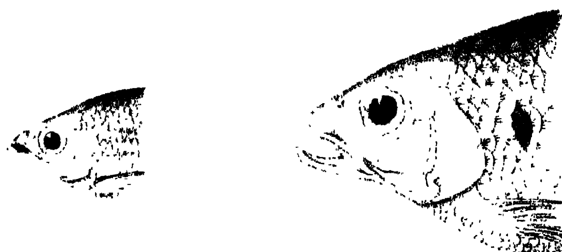
There can be no doubt about Blyth's *St. indicus* being the same as *tuberculatus*, but whether the species really occurs in the plains near Mirzapúr and Wuzirabád, I have not as yet been able to ascertain.

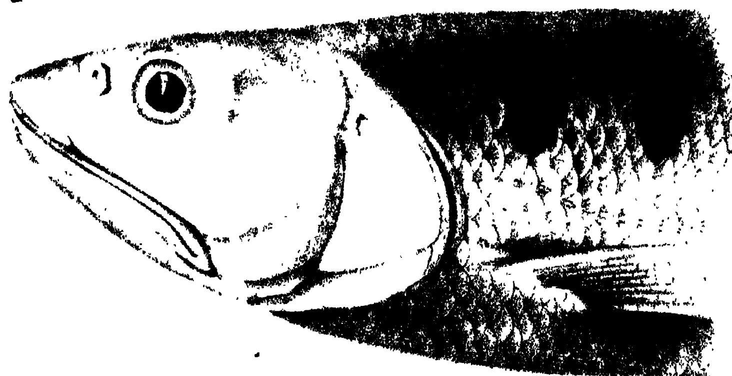
TIARIS SUBCRISTATA, Blyth.

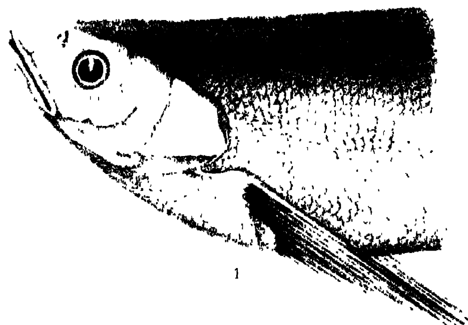
In addition to my description of this Andaman and Nicobar lizard in J. A. S. B., vol. xxxix, p. 180, I have to note the following.—The number of scales round the body varies between 90 and a little above 100, 18-22 scales being on the ventral side. The two groups of enlarged, or rather often only more pointed, scales on the upper side of the occiput usually exist only in old males. The subcaudals are slightly larger than the scales above and at the sides of the tail, the latter being more distinctly imbricate. The fore-limb when laid backward occasionally reaches as far as the anus, and the hind-limb when laid forward exceeds the tip of snout by one-third the length of the fourth toe.

As regards coloration I may add, that there is occasionally a distinct yellowish band present, extending from the occiput along each side of the middle of the back, on the lower side margined blackish. The two yellow bands form an outward angle opposite each femur and then unite into one, a short distance beyond the base of the tail, and are accompanied on either side by a series of large blackish spots. Extremities spotted or indistinctly barred with brown and yellowish white.

(To be continued.)

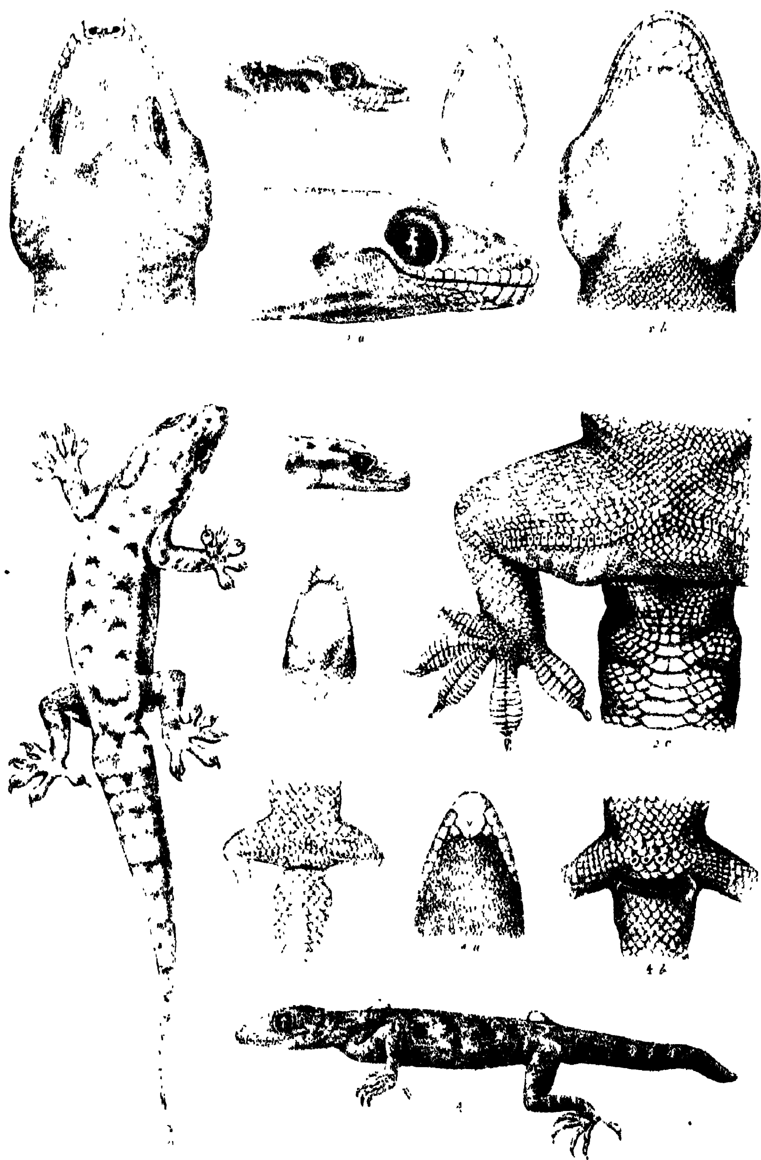






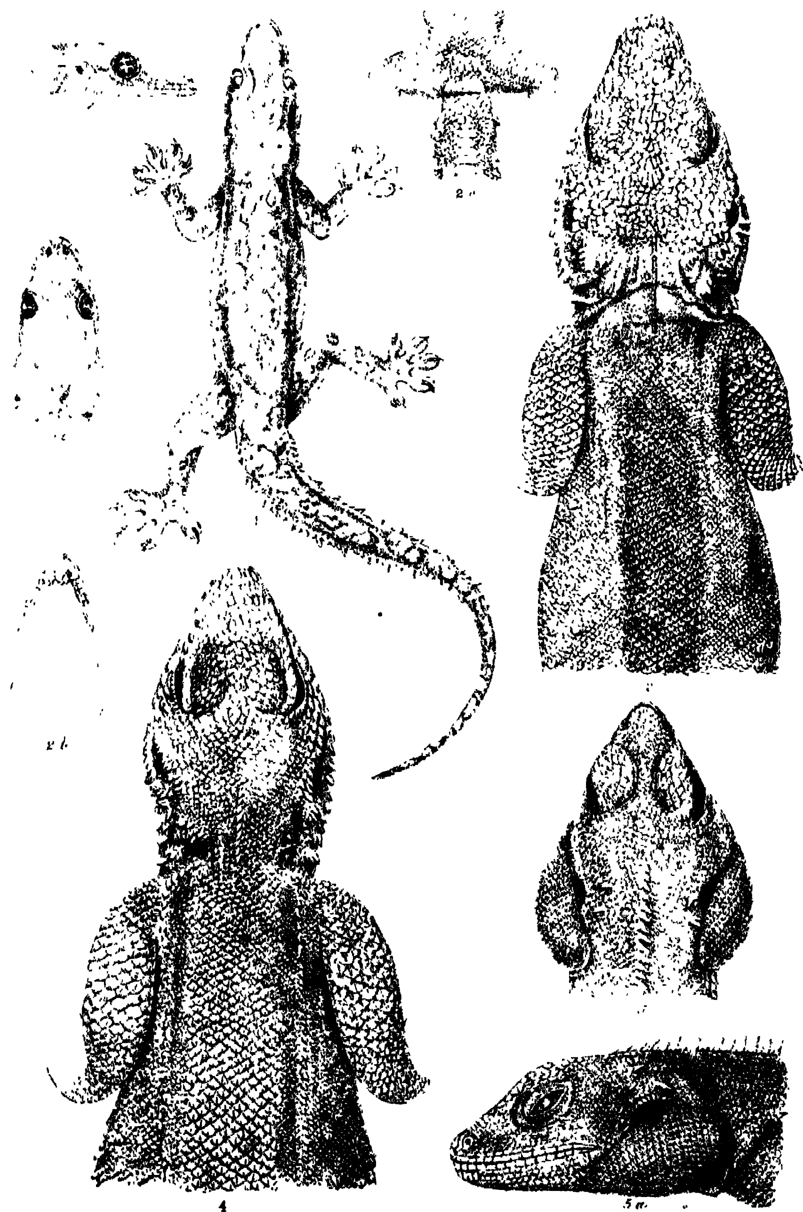
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S. Sedgfield, lith. 1. Danio aurolineatus. 2. Barilius Bakeri. 3. Barilius bola. 4. Chela gora. Calcutta.



S. Sedgfiela Lith. Calcutta.

1. Hemidactylus sub-triedrus, Jerd. 3. He. (Doryura) Berdmorei, Blyth.
2. [illegible] giganteus n. sp. 4. Gymnodactylus La[illegible]anus, sp.



1-2. Hem. (Doryur.) Mandellianus, n. sp. 3. Stellio tuberculatus, Gray. 4. Stellio Dayanus, n. sp. 5. Charasia Blanfordana, n. sp.

S. S. Lith. Calcutta

// JOURNAL

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Part II.—PHYSICAL SCIENCE.

No. II.—1872.

Notes on various new or little known Indian Lizards,— by Dr. F. Stoliczka.

[Continued from p. 116.]

Fam. SCINCIDÆ.

Genus. Euprepes, Wagler, (as rest. by Günther).

Euprepes [Tiliqua] macularius, Blyth.

Pl. V, fig. 1, upper view of the anterior part of the body; 1a, side view of the head; natural size.

See Blanford in Journ. Asiat. Soc. Bengal, 1870, xxxix, pt. II, p. 358, and Anderson in Proc. Zool. Soc. Lond., 1871, p. 157.

This species is readily distinguished from *E. carinatus* by proportionately shorter and stouter limbs, and by a somewhat shorter head. As a rule the scales are in full grown specimens seven-carinate, the middle carina being separated from the adjoining by a somewhat deeper and wider sulcus, than exists between the other ridges. In Sub-Himalayan specimens this is particularly well marked.

Blanford reported the occurrence of the species in various parts of Central India. The Indian Museum received specimens from Cachar and Asám, reported upon by Dr. Anderson. I obtained some on the Parisnáth hill, exactly identical in the small size and uniform coloration with those noted by Blanford. There are only a few whitish spots at the side of the neck and the dusky colour of the sides of the belly gradually passes below into the white one. Specimens sent by Dr. Day from the Sone river in Birbhúm

have no dark spots on the back, but numerous white spots at the side of the belly. The stripes at the side of the tail are in Central Indian specimens, and in those from W. Bengal, and also from northwards near Hardwár, very thin and often rather indistinct. Young specimens have 5, old ones 7 keels on each scale. Sikkim specimens from the Rungnu valley, (one of which attains the large size of $6\frac{3}{8}$ inches, of which tail is $3\frac{6}{8}$, and has 30 longitudinal and about 28 transverse rows of scales between the fore and hind-limb), generally have two or four rows of brown spots along the back, the spots becoming somewhat irregular and more prolonged on the posterior body; sides with blackish and more or less numerous white spots, the black spots inclining to form longitudinal series; sides of the tail very distinctly streaked with brown and white, but when the terminal half, or third, of the tail is renewed, it is uniform. In Sikkim I only saw the species in the lower valleys, up to about 3,000 feet, but generally at lower elevations, and by no means common. Asámese specimens do not differ in any particular from the Sikkim ones, and similarly coloured varieties were also collected by Dr. Day at Rurki, only the specimens are smaller, and the white spots at the side of the body fewer, and somewhat indistinct.

The species also occurs in the neighbourhood of Calcutta, where I obtained three specimens during the last winter (1860 to 1871). Each of these has on the back two distant, almost continuous rows of brownish black spots, and the brown colour between these rows is darker than that between them and the respective edges of the back. On the hind part of the body, the spots become broken up and finally disappear. The sides are either distinctly spotted, with white as in Darjiling specimens, or they are more uniform dusky; the tail is on the anterior half always longitudinally streaked with brown, intermixed with white. The lower side is uniform whitish, with the edge between each two scales slightly darker, forming the longitudinal "obscure dark striæ," to which Jerdon alluded in his note J. A. S. B. xxii, p. 479. Some of the specimens obtained at Pankabarí, on the northern edge of the Sikim Terrai, agree in coloration with those from Calcutta, having the middle back darker brown than the sides of it, while others again have as many as eight longitudinal, more or less continuous, black bands along the back.

Pegu specimens do not differ from those from Asám and Darjíling, and I suspect that Theobald's Burmese species, identified by him with Kuhl's *E. multicarinatus* from the Philippines, is the same as Blyth's *macularius*, but the two are by no means identical, as suggested by Theobald, (Journ. Linn. Soc. Zool. x, p. 26). In comparing specimens from various localities, it struck me that the hill forms generally have stouter legs and shorter toes than specimens found in low country.

E. macularius appears, at least partially, to replace *E. carinatus* in Central India, but not apparently in South India; it is, however, in all the locali-

ties East of the Hooghly much rarer, than the latter species. There are evidently two distinct races: a smaller and almost uniform coloured variety, occurring all through the Central Provinces and extending northwards to the base of the hills at Hardwár, and westward probably into southern Panjáb; and a larger, and generally striped, variety, occurring eastwards all through Bengal, Asám and extending into Pegu.

Beddome (Madras Journ. Med. Sc. for 1871) appears to question the distinctness of *macularius* from *carinatus* (= *rufescens*), but there can, I believe, be no doubt on that point. Whether his 5-keeled specimens are *carinatus*, and the 7-keeled ones true *macularius*, must be decided on a re-examination of his specimens. Both species often occur together.

Euprepes [Tiliqua] carinatus, Schneider.

Colour above brown or olive brown, with or without dark edgings to the scales, a pale band on the edges of the back; upper half of sides blackish with or without white spots, lower half pale, a short pale streak from ear to shoulder; below whitish, tinged with orange or red in males during breeding season, particularly at the sides of the belly. This is the usual colouration in specimens from Bengal, Central Provinces, Dakhin (at Púna) and Bombay. (Comp. Günther, I. R., p. 79 and Blanford, J. A. S. B., 1870, xxxix, pt. ii, p. 356). Specimens from Burma and the Malayan Archipelago are very similarly coloured (see J. A. S. B., xxxix, pt. ii, p. 169). Bengal specimens, of which I examined a very large number, have quite as often 5 as 3 keels on the scales, those from the Dakhin (Dekhan) and Bombay are mostly only three-keeled. As a rule there are 32 longitudinal rows of scales round the middle of the body in full grown specimens, in younger ones often 30, very rarely only 28.

Euprepes [Tiliqua] trivittatus, Gray.

Gray, Ind. Zool.—Jerdon, J. A. S. B., xxii, p. 478.—Theobald, Cat. Rept. Asiat. S. B, p. 24.—Blanford, J. A. S. B., xxxix, pt. ii, p. 357.—Anderson, Proc. Z. S., 1871, p. 158.

This is undoubtedly a species distinct from *Tiliqua carinata*, and in part combining the characters of the latter, and of *T. monticola* which it considerably resembles in coloration. I received two specimens from Púna (in the Dakhin,=Dekhan) through my collector. They are both young, only 4½ inches long, but when compared with equally large specimens of *carinata*, the head is, as stated by Jerdon, shorter and somewhat higher, the rostral is flattened above, the supranasals form a distinct suture, frontals proportionately smaller, (the anterior in one specimen obliquely divided in two shields), posterior frontals form a suture, the vertical is longer and posteriorly narrower, than in any specimens of *T. carinata* I saw. The other shields of the head do not differ. Edge of ear in front with 3 or 4 small, pointed, subequal lobules. Scales

round the middle of the body in 36 longitudinal series, and in 40-42* transverse series between fore and hind-limb; each scale with 3† median well defined keels, two others at the sides being only occasionally indicated.

Colour, above, olive brown, with three narrow, equidistant, greenish white bands, margined with blackish brown, and with one on each side of the body, passing through the ear; all five bands continue on the tail, but are less distinct; shields of head margined with dark; edge of eyelids yellow; feet above brown. Below, uniform yellowish white, tinged with fleshy posteriorly.

The head and body together are proportionately shorter than in the preceding species:

	T. trivittata.	*T. carinata* from Matheran.
Total length,	4·25	4·5 inches
Body,	1·85	1·85 ,,
Head alone,	0 85	0 90 ,,
Tail,	2 5	nearly 3· ,,
Fore-limb including claw,	0 6	0·6 ,,
Hind-limb,	0 75	0·85 ,,
Girth round the middle of body,	1·1	0·95 ,,

EUPREPES MONTICOLA, (I. R., p. 80).

This species has been found by Mr. Wood-Mason at Sahibgunj on the Ganges, and I obtained it also at Jabbalpúr in the Central Provinces; in both cases in the plains. The specimens exactly agree in structure with Günther's figure and description, but there usually is on each scale (particularly towards the edges of the back) a third median keel, between the two more distinct ones, traceable. Scales in 35 or 36 longitudinal series round the middle of the body, and in 34-40 transverse ones between the limbs. The lower eyelid has a distinct transparent simple disc, a character not noticed by Günther.

Colour, above and on the upper half of the sides greenish brown, with numerous black spots, sometimes inclined to arrange themselves in transverse series, a yellowish white band on each side and in the middle of the back, about one scale broad, but generally running along the sutures of two rows; sides greenish, spotted with pure white, their lower halves more or less tinged with black and white, and sometimes with an indistinct white band between the limbs, appearing better marked at the side of the tail; a yellowish black-edged streak below the eye, continued to near the ear, the frontal denticulations of which are yellow; edges of eyelids bright yellow. Below, uniform yellowish white.

I very much doubt that this is an inhabitant of the highlands of Sikkim, and Schlagintweit's specimens were most likely obtained in a low valley of that province, at 1000 or 2000 feet elevation, but not at 8000 feet, though probably preserved and ticketed in a comfortable station at that height; or

* 49 rows in adult, loc. cit.

† 5 keels are recorded in an adult, loc. cit.

else those gentlemen's barometers must have been, as usually in similar cases, out of order.

What Theobald quotes as *Tiliqua monticola* in Cat. Rept. Asiat. Soc. Mus., p. 24, is not this species, but to all appearance *Euprepes olivaceus;* there are three very slight keels on the dorsal scales, 30 longitudinal series round the body, and about 34 between fore and hind-limb; anterior frontal in contact with rostral, but separated from vertical by a short suture of the posterior frontals. Uniform olivaceous above, paler below.

EUMECES, PLESTIODON, HINULIA, RISTELLA and *allied genera.*

I adopt the name *Hinulia* as originally proposed by Gray.

The name *Eumeces* cannot any longer be retained for the species which are referred to it in Günther's 'Reptiles of Brit. India'. Already in J. A. S. B., vol. xxxix, p. 174, I have drawn attention to Dr. Peters' observation, that Wiegmann's name *Eumeces* had been proposed for Geoffroy's *Scincus pavimentatus* = *Sc. auratus*, *Schneid.*, = *Scincus Schneideri*, Geoff., = *Plestiodon Aldrovandi*, Dum. and Bib. &c. Therefore, *Plestiodon* is to be considered as identical with *Eumeces*, which is the oldest name. The only as yet known representative, we have of this restricted type of Lizards in India, is Blyth's *Eurylepis* from the Panjáb, which province has to a large extent an admixture of African forms in its fauna (Comp. Jour. Asiat. Soc. Bengal, xxiii, p. 739). Blyth, when describing *Eurylepis*, correctly refers to the figure of *Sc. pavimentatus* in the 'Descr. de l'Egypt'., but he was not aware that the species is identical with *Sc. Schneideri*, and that it is the type of *Eumeces.** There does not appear to be a difference† between *Eurylepis* and

* Dr. Anderson (Proc. Asiat. Soc. B., for Sept. 1871) suggests that Fitzinger's name *Mabouia*, (or rather *Mabuya*, as invariably written by Fitzinger), should replace *Eumeces*. I do not think that there is sufficient reason for this. Fitzinger, when suggesting the name *Mabuya* in 1826, (in Verz. Rept. p. 23), certainly says that the lizard possesses palatine teeth, and the author places the genus in opposition to Gray's *Tiliqua* which, he says, does not have palatine teeth. But Gray's old genus *Tiliqua* includes a vast number of Scincs with and without palatine teeth. Moreover, Fitzinger, when giving in the same work (p. 52) a list of the species of *Mabuya*, quotes as the first species *Scincus quinque-carinatus*, Kuhl, as the second *Sc. carinatus*, Daudin, as the 12th *Sc. agilis*, Radde, and as one of the last *Sc. ocellatus*, Daudin, the *Mabouya par excellence* of old author's; but neither for the first nor for the last species has Fitzinger's name *Mabuya* been retained. When writing his Syst. Rept, published in 1843, Fitzinger was perfectly well aware of this confusion, and dropped the name *Mabuya* altogether, most likely because it had not been accepted by Dum. and Bibron. He quotes (l. cit.) Lacepede's "Mabouya" (*Sc. ocellatus*, Daud.) as the type of Wiegmann's *Gongylus*, and distributes the other species which he formerly referred to *Mabuya* into about half a dozen genera. In 1845 Gray wished to rescue Fitzinger's name, (more correctly written in the form of *Mabouya*), retaining it for Radde's *Sc. agilis* as type, and only in this signification can, I believe, the name *Mabouya* find a place in our literature, if we wish to avoid a greater confusion than already exists.

† Compare Anderson in Proc. A. S. B., Sept. 1871.

Eumeces. The dorsal scales of *pavimentatus* are often very irregular in their size, and enlarged, as are also those of Blyth's species.

The Indian and Malayan species, referred by Günther in his 'Reptiles of India' to *Eumeces*, are arranged by the same author under two groups. One includes *Hinulia*, *Mocoa*, and *Podophis*, the other *Mabouya* (type *Sc. agilis*, Radde) and *Riopa*, to which *Senira* has to be added, if Mr. Theobald is correct in identifying a lizard from Rangún with *Senira bicolor* of Gray (Linn. Soc. Jour., Zool., x, p. 27). Whether the three first named should be considered only as subgenera of *Lygosoma*, Gray, as adopted by several continental herpetologists, or whether they should be retained as distinct genera, is for the present not of very material importance. I can only say that the Indian species of *Hinulia* and *Mocoa* are fairly divisible, and the same is the case with *Mabouya* and *Riopa*. All have the palatal notch situated far backward and the palate itself toothless, but this is a very general character, and equally applies to *Hagria*, *Ristella* and several other well distinguishable genera.

Of *Hinulia* there are as yet only three species known from British India, and as they had been rather misunderstood, I shall give a figure of the head and of the sole of the hind foot of each, shewing the characterstic distinctions between them. *H. indica* is as yet only known from Sikkim and the adjoining hills; *H. maculata* occurs throughout Bengal and Barma; *H. Dussumieri* is from the Malabar coast. Of *Mabouya* and *Podophis* I do not know a single species which occurs within the limits of British India, as now understood (excluding Penang). Of *Mocoa* and *Riopa*, the species are numerous and mostly of small size.

Hinulia indica, Gray.

Pl. iv. fig. 1, 1*a*, side and upper views of the head, natural size; 1*b*, sole of left hind limb, twice the natural size.

Eumeces indicus apud Günther, I, R., p. 89, exclusive of the synonyms quoted under *Lygosoma* and *Mocoa*.—*E. indicus*, apud Anderson in Proc. Zool. Soc., 1871, p. 158 (in part).

The general structure of scales is as described by Günther. The number of longitudinal rows is usually 36 or 38; there are 60-70 transverse rows at the side of the body between fore and hind limb, but there are only 46-55 scales in a row at the edge of the vent between axil and loin. The fore foot, when laid forward, scarcely ever reaches the snout, but it usually extends in front beyond the eye. The four supraciliaries are followed by two small shields; ear opening large, without any denticulations in front.

The usual coloration is as originally described by Gray. Upper side brown, generally bronze, rarely with an olive tinge, uniform, or with a few

scattered dark spots; limbs above almost uniform brown; sides towards the back with a dark brown or blackish band, separated from the back by an indistinct, partially interrupted, narrow, white band; on the lower half of the sides the colour gradually passes into dull brown, more or less spotted or marbled with paler, which markings are generally also traceable in the dark band; sides of tail greyish brown with an upper dark edge, and marked with darker and paler small spots, or indistinct stripes. Below, uniform greenish iridescent white; limbs and tail of a pale fleshy brown colour during life.

This is a much larger species than any of the two following, but it is by no means common in Sikkim. I found it from the base of the valleys up to about 6,000 feet, and also received it from the Bhután hills. It very likely extends eastwards into Asám.

The young specimen referred to by Dr. Anderson (l. cit.) under the head of *Eu. indicus* belongs to the next species; and judging from the description of the coloration in Günther's I. R. (l. cit.), it appears probable, that specimens of the next species were also referred to this one as young. There can, however, be no mistake about the distinctness of the two. *H. indica,* as compared with *H. maculata,* is a much stouter and larger form, with comparatively larger scales, arranged in a smaller number of transverse rows between fore and hind limb; the former has 10 rows of scales on the back between the dark bands, the latter only 8; in *indica* the rostral, anterior frontal, and the supraorbitals are slightly convex, the interspace between the latter moderately wide, the preanal shields comparatively small; the palm and sole entirely covered with spinous tubercles, with some larger ones on the posterior edge of the sole. In *H. maculata* on the contrary the rostral reaches far backwards, is flat or almost concave above, the anterior frontal is also flat, the supraorbitals tumid with a very narrow space between them, and the palm and sole are only partially tubercular. There is also a difference in coloration; the lateral band at the side in *indica* is never very distinct, and is not margined below by a white line, which is always well marked in *maculata.*

In six specimens examined the length of the body varies between 3 and 3.75 inches, the tail being, when in its natural growth, about twice that length, but often it is reproduced and then about equal in length to the body.

Hinulia maculata, Blyth.

Pl. iv, fig. 2, 2*a*, side and upper views of the head, natural size, 2*b*, sole of hind limb, twice the natural size.

Comp. Stoliczka, in Journ. Asiat. Sc. B., xxxix. 1870, p. 174.

The 5th and part of the 6th labial are below the orbit, both are nearly equal in size; the median pair of the enlarged preanals is sometimes (though

rarely) united into one large shield. The hand has no tubercles on the extreme inner edge, and the sole is only partially tubercular, being generally smooth all along the bases of the 3rd and 4th toes; there are 17-22 sharp tubercles on the 4th free toe.

I have examined specimens from the Andamans,* Moulmein, various parts of Pegu, Asám, Sikkim and from the Parisnáth hill in W. Bengal. The Moulmein specimens are the largest, attaining 7 inches; next come those from Asám and the base of the Sikkim hills, just above the Terrai at Pankabari; specimens collected at greater elevations, as for instance those about Darjíling (7-8000 feet) very rarely appear to attain 6 inches in length, and on the Parisnath I did not get (in April) a single specimen above 5 inches. All from the latter locality are, above, distinctly bronze brown, while those from the Himalayas are generally somewhat olivaceous or, when young, with greenish metallic lustre; they also often have the back much spotted with blackish, and the sutures between the head shields are more or less black, but in every point of structure the two forms are identical.

In all the specimens, I saw, the fore foot when laid forward, reached beyond the eye, but never to the front of the rostral. The fifth or last supraciliary is the smallest, but rarely united with the fourth, which is then followed by one or two small shields. The number of transverse rows of scales on the side of the body between fore and hind limb varies from 80 to 95, but the number of scales in one row at the edge of the belly is only about 60.

Hinulia Dussumierii, Dum. and Bib.

Pl. iv, fig. 3, 3*a*, side and upper views of the head; 3*b*, sole of left hind limb.
Lygosoma Dussumierii, D. and B., Erpet. Gen., v, p. 725.
Eumeces Dussumieri, apud Beddome, Madras Journ. Med. Sc. for 1870.

I am indebted for a specimen of this very rare species† to Major Beddome, who obtained it in Malabar, where also the original specimens have been procured by Mr. Dussumier. As the species is rare, a slightly verbal alteration of Major Beddome's description may not be out of place.

Head conical, depressed above; body high, roundly subquadrangular; tail much longer than the body, gradually tapering to a point. The fore leg, when laid forward reaches to the tip of the snout, and the hind leg ex-

* One of the two specimens, noted by Theobald in Cat. Rept. Asiat. Soc. Museum, 1868, p. 25 (letter *b.*) as coming from the Andamans is an *Euprepes* which, if not identical with Steindachner's *E. macrotis*, from the Nicobars, belongs to a new species. Scales in 30 longitudinal series, each sharply three-keeled; supranasals not quite in contact, frontal forms a broad suture with vertical, occipitals as usually distributed; lower eyelid scaly, but the scales are rather larger in the middle; greenish olive above; ear large with scarcely any projecting denticles in front; sides blackish, below white.

† In the specimen described by Major Beddome the first and second supraorbitals appear to have been united.

tends with half of the fourth toe beyond the shoulder. Rostral large, reaching far backward, and flat above; anterior frontal above broadly truncate, but very narrowly behind, the two posterior frontals nearly meeting; vertical very narrowly in contact with the anterior frontal, and much contracted and elongated posteriorly; supraorbitals 5, much swollen, the last followed below by two small shields; interorbital space very narrow; a pair of anterior occipitals, narrowed in front, broad behind; median occipital obtusely pointed in front, acutely behind, and in size subequal to one of the anterior occipitals; posterior occipitals larger, meeting behind with a narrow suture, in front in contact with the anterior occipital, the fifth supraorbital, and a small shield following it; shields on the side of the head regular; 8 upper and 7 lower labials, the last very small; first chin-shield single, second in a pair, forming a suture, followed by 3 other separate and widely diverging pairs; opening of the ear a long vertical slit, not denticulate in front; 10-12 longitudinal rows of scales round the middle of the body, those on the sides considerably smaller than on the belly;* about 76 transverse series on the side between fore and hind-limb, but only 66 on the edge of the belly; preanal scales moderately enlarged; of the subcaudals there are very few in front enlarged, but near the middle and posteriorly all; palm nearly entirely covered with tubercles, sole only at the bases of the 1st and 5th toes, and on the posterior edge, the remainder being smooth; about 23 sharpened tubercles under the free portion of the fourth toe.

Colour, above, fulvous, tinged olive in front and reddish posteriorly, with two longitudinal, submarginal, black bands, partially or entirely broken up into spots and becoming obsolete on the tail, which is red; along the edges of the back runs a metallic greenish white line, originating on the supraciliary edge; it is most distinct on the neck, but gradually disappears on the tail. A pure black band originates at the nasal, continues through the eye along the upper side of the body, and on the tail, disappearing towards its termination; the black band is bordered below by a narrower white band, which originates below the eye, passes through the lower part of the ear to the loin, and is below, particularly at the side of the vent, again bordered with black. Legs above olive brown with darker marblings and indistinct fulvous spots; tips of toes dark. Below, uniform greenish iridescent white; tail red.

Total length 4.75 inches, body 1.87, tail 2.87 inch. In general structure of the scales, the flattened upper rostral, tumid supraorbitals, narrow vertical, imperfectly tubercular soles, and in general style of coloration, the Malabar form agrees with the Bengal *maculata*, but the limbs are longer in proportion, and the details of coloration considerably different. The black band is at the side of the body broader, and the white one, bordering it below, originates in the present species below the eye and passes through the lower angle of the opening of the ear, while in *maculata* it begins almost behind the eye and

* This is also the case in *H. maculata.*

passes through the upper edge of the ear; the number of longitudinal rows of scales also appears to be slightly larger in the present species.

Mocoa Sikkimensis, Blyth.

Pl. v, figs. 2, 2*a*, side and upper views of the head; three times the natural size.
Journ. Asiat. Soc. Bengal, 1854, xxii, p. 652.

Body slender, head short, obtuse and rather flattened above; no supranasals; lower eyelid with a transparent disk in the middle. Shields of the head regular, anterior frontal in contact with the rostral and vertical, which is much attenuated posteriorly; posterior frontals small, and not in contact, unless exceptionally; 4 supraciliaries; posterior pair of occipitals about twice the size of the anterior, middle shield small, shaped like the vertical, but shorter; 3 to 4 pairs of elongate transverse shields behind the occipitals; 2 loreals and 2 pre-oculars, each pair sometimes united into one vertically, or horizontally, elongated shield; 7 upper labials followed by two smaller shields, the 5th under the orbit, but not much elongated; 8 lower labials, the last smallest; anterior chin-shields enlarged; ear small rounded, generally with 2 or 3 small projecting shields on the front-, and a few still smaller lobules on the hinder, edge. Scales generally in 24 longitudinal series, and in 46 transverse series between fore and hind-limb; these numbers vary very little; young specimens have occasionally only 44, but the largest never appear to have more than 48, transverse series. A pair of large preanals. Subcaudals also enlarged, except the first few. The fore foot reaches to the anterior angle of the orbit, when laid forward, and the hind foot is three fifth the distance between fore and hind-limb. Palm and sole tubercular; fourth finger barely longer than the third; fourth toe nearly a quarter longer than the third.

Colour, above, bronze brown, (sometimes with an olive tinge and a metallic lustre during life,) uniform, or with three to five irregular series of small dark brown dots, the centre ones often arranged into dark lines; sides darker, near the back more or less blackish brown, commencing with a dark band at the rostral shield. Above, at the edges of the back, the black is margined by a somewhat indistinct pale line or band, occasionally dissolved into more or less confluent white spots; below, there is also an indistinct pale, undulating, band, passing from the ear to near the loin; the upper portion of the sides is less, the lower more numerously, spotted with white; the brown, as well as the somewhat indistinct whitish, spots extend on to the sides of the tail. Upper labials whitish, spotted with brown. Chin uniform greenish white in young, spotted with greenish dusky in older specimens. Vent below greenish white, on the posterior part, but especially between the femora and below the tail, reddish, this colour being more or less bright according to sex and season. The brown spots on the back are very variable, both in number and distinct-

ness. Young specimens generally have a distinct greenish metallic tinge on the whole body.

Largest specimen measures 5.25 inches, of which the body is 2", or a little less; some specimens have a stouter tail than others.

Hab. Sikkim, at elevations of from 3,000 to 10,000 feet; generally found between large stones in places exposed to the sun.

Jerdon* says that Günther's *Eumeces Himalayanus*† is identical with *Sikkimensis*, which latter Günther quoted as doubtfully belonging to *Hinulia indica.*‡ Dr. Anderson (Proc. Zool. Soc. 1871, p. 158) also says, that the Sikkim form "agrees in its transparent eyelid and all its other details with Günther's *Eum. himalayanus;*" he has, however, I believe, never seen an example of the true *Mocoa Himalayana* of Günther. I have specimens of the latter from Simla and the hills to the West, and I find that although they closely resemble *Sikkimensis*, they are nearly as well distinguishable, as are *Hin. indica* and *maculata*. Among five specimens of *Himalayana* only one has 26 longitudinal rows of scales, the four other specimens have each 28 longitudinal rows; there are 48 to 50 transverse rows between fore and hind-limb, but only 42 to 44 scales in a row along the edge of the belly. On the back there are, as in *Sikkimensis*, only 4 longitudinal rows, but at the sides and below the scales of *Himalayana* are decidedly smaller. Other differences are: the limbs, though not longer than in *Sikkimensis*, are in *Himalayana* somewhat more slender, the transparent disk on the eyelid is larger, the ear-opening is also larger and with much more distinct lobules in front, the posterior frontals are more developed, almost meeting the anterior frontal and the vertical in a point, as stated by Dr. Günther, while in *Sikkimensis* the two posterior frontals always remain well separated.

The colour of *Himalayana* is, as described by Günther, above, greenish olive (not bronze brown, or only tinged with olive, as in *Sikkimensis*), with a few interrupted series of dark and whitish dots; a blackish band commences at the nasal and continues through the eye along the upper side of the body to near the tip of the tail, it is either uniform or with a few white spots, and on the tail it becomes generally less distinct. At the edge of the back the black band is margined by a white line, (most distinct on the neck), and below by a much broader white band, commencing at the lower edge of the orbit and terminating at the hind limb. Below this white band the sides are mottled or speckled with dark. The lower surface is uniform greenish white; tail reddish below (seasonal). All this strongly contrasts with specimens of *Sikkimensis* of which I collected a very large number of specimens in Sikkim. I do not wish to say that the two forms may not be shown to represent mere varieties of

* Proc. Asiat. Soc. for February 1870, p. 73.

† Reptiles of India, p. 86. ‡ Ibidem, p. 89.

one type species, but unless direct transitions, or transmutations, from one form into the other had been proved by observations, we have no right to ignore the distinctions which had been pointed out, and which do in reality exist.

M. Sikkimensis appears to be, however, more closely related to *Mocoa Schlegelii*, Günther (l. c., p. 86), which also has been described from a Sikkim specimen. In size, form and general structure there does not appear to be a great difference between the two; the number of longitudinal rows of scales round the body is given as 25, and that between the axil and groin as 35, the latter number is, however, too small for *Sikkimensis*. The colour of *Schlegelii* is said to be black above, blackish below, which I certainly never observed among a few hundreds of *Sikkimensis*.

MOCOA SACRA, n. sp.*

Pl. iv, fig. 4, side view of the animal, natural size; 4*a*, 4*b*, 4*c*, upper, side, and lower views of the head and neck, enlarged.

Habit slender, head somewhat depressed, obtuse in front, body shorter than the tail, the latter gradually tapering to a point. No supranasals, eyelid with a perfectly transparent disc; scales in 22 longitudinal series round the middle of the body, and in 40 transverse series between fore and hind-limb. Head shields regular, like in *Sikkimensis*, but the postnasal scarcely reaches the top of head, and the fifth upper labial is comparatively longer than in that species. A few enlarged scales behind the occipitals. Subcaudals single, enlarged, except the two first pairs. A pair of large preanals. Ear in front denticulated with three equal lobules.

Total length 3.37 inches of which the tail is 2″; feet slender; the fore foot reaches to the middle of the eye, when laid forward, the 3rd and 4th fingers are equal or subequal; the hind foot is two-third the distance between fore and hind limb, or half that between the latter and the ear; the 4th toe is slightly longer than the 3rd.

Above, light iridescent bronze brown, with a few dark brown spots scattered on the head and body, each of these dark spots being accompanied by an indistinct pale spot, on both, or only on one side; a narrow black band from the rostral through the eye, passing above the ear and becoming indistinct on the sides of the belly; a white band below the black, best marked through the ear and above the fore foot, but becoming also indistinct on the belly where a few whitish spots separate the lower light from the upper darker parts; labials somewhat spotted with dark; chin white; breast and belly, below, greenish iridescent white; femoral region and tail below pale vermilion, that colour passing also on the sides of the tail, where only a few indistinct pale spots exist.

This species is very closely allied to *Sikkimensis*, differing from it by its more slender and comparatively longer hind feet, smaller number of

* See Proc. A. S. B., September 1871, p. 195.

longitudinal rows of scales, those on the vent being decidedly more transversely elongated, than in the Himalayan form; further in the more elongated 5th upper labial, few enlarged shields behind the occipitals, and by the subcaudals being enlarged almost from the beginning. There is also a slight difference in coloration.

Hab. Parisnáth hill in West Bengal. The only specimen was obtained near one of the Jain shrines on the top of the hill.

RISTELLA, Gray.

Ann. and Mag. Nat. Hist., Ser. I, 1839, p. 333.
Cat. Lizards B. M., 1845, pp. 71 and 85.

Body and tail elongate, subcylindrical; limbs four, feeble, anterior with 4, posterior with 5 toes, thumb and inner toe shortest; all toes provided with retractile claws, lying between two terminal enlarged shields; head shields regular; nostril in a single lateral shield; supranasals none; lower eyelid scaly; ear opening small; scales of body keeled or nearly smooth; gape situated far backward; palate toothless; teeth of the jaws small, equal, numerous, compressed.

This generic character has been derived from a specimen, kindly sent to me by Major Beddome; it belongs, I believe, to a genus which was originally established by Gray for a North Indian specimen, *Ristella Rurkii* (l. cit. p. 86), but the species appears to be different; at least it is impossible to identify both from the short description given of *R. Rurkii*, and it is not noted in Günther's Reptiles of India.

The 4 anterior toes and the retractile claws are important distinctions of the genus which must be classed next to *Heteropus.*

RISTELLA TRAVANCORICA* Beddome.

Ateuchosaurus Travancoricus, Beddome, Madras Journ. Med. Sc., 1870, p. 33.

Pl. iv, fig. 5, upper view of the animal, natural size; 5*a*, 5*b*, 5*c*, upper, side and lower views of the head, enlarged; 5*d*, inner view of hand with the claws retracted, 5*e*, sole with the claws drawn out.

Body very elongate, subcylindrical, but somewhat depressed; muzzle short, obtuse, tail considerably longer than the body and very gradually tapering. Rostral convex in front, reaching to the upper surface of the head; one large prefrontal, two small posterior frontals, widely separated; the vertical forms a broad suture with anti-frontal and is posteriorly much elongate; four or five supraciliaries, slightly elevated, the first shield largest, but it is sometimes divided in two, last shield smallest; five occipitals, the two anterior and the median one subequal, the posterior pair larger, and the adjoining scales are

* *R. malabaricus*, (*olim*), Proc. A. S. B., 1871, p. 195.—Since my description of this species was drawn up, I observe that Major Beddome redescribed the species, in Mad. Med. Journal for 1871, also under the name *Ristella*, which name I had pointed out to him.

slightly larger than the rest on neck. Nasal shield moderate, pierced nearly in the middle by the nostril; one loreal, one preocular separated from the angle of the eye by a few minute shields; 3 or 4 small shields at the hinder angle of the eye, followed by regular scales. Upper labials 6, the eye above the 3rd and 4th; lower labials 5, narrow but long; lower rostral large, followed by one single and 3 pairs of enlarged chin shields. Scales on neck smooth, on body slightly two-keeled, round the middle of body in 26 longitudinal rows, there being 6 rows on the back, exclusive one row on either edge; on the belly there are also 6 rows, the scales being slightly larger than those of the back; 35 transverse rows between fore and hind limb; the two median preanal shields somewhat larger than the others; subcaudals not very conspicuously enlarged, (but they are generally enlarged in this group of SCINCIDÆ when the tail has been reproduced). The fore limb, when laid forward, reaches to the angle of the mouth, and the length of the hind limb is equal to half the distance between axil and groin. Total length of specimen 3.62 inches, head and body being 1.5 inches.

General colour, above, dark fulvous brown, each of the scales in the 6 dorsal rows with a median black streak, forming black longitudinal lines, continued on the tail; edge of back a little more distinctly fulvous brown, sides blackish with small white spots; below, yellowish white, spotted with black on chin and throat; tail below variegated with black and yellowish white, (during life probably reddish).

Hab. According to Major Beddome, common in moist jungles of the Western Ghats between 2000 and 5000 feet elevation.

RIOPA ANGUINA, Theobald.

Pl. v. fig. 4, animal, natural size; 4*a*, 4*b*, 4*c*, top, side and lower views of the head, enlarged; 4*d*, upper side of hand; 4*e*, inner side of foot.

Theobald, Journal Linn. Soc., Zool. vol. x, p. 27.

Anderson, Proc. Zool. Lond. 1871, p. 159 (in part).

RIOPA CYANELLA, n. sp.

Pl. v, fig. 3, 3*a*—3*e*, exactly corresponding figures with 4, 4*a*—4*e*.

? *Riopa Bowringi* apud Theobald, Linn. Soc. Journ., Zool. x, p. 26.

Riopa anguina, apud Anderson, P. Z. S., p. 159, (in part).

Theobold's description of *R. anguina* is somewhat incomplete. Dr. Anderson having kindly shown me the specimens in the Museum, I found that they belong to two distinct species, and that his description, as regards coloration at least, partly refers to *anguina*, partly to *cyanella*. In order to prevent misapprehension I give a brief description of the characters of both, and add a figure of each species.

R. anguina. Body elongate, subcylindrical, slightly depressed; head conical, rather short; supranasals in contact behind the rostral; anterior

frontal in contact with the vertical which is rather narrow, and barely reaches beyond a straight line connecting the middle of the orbits; four supraciliaries followed by a small shield; anterior pair of occipitals nearly equal to,* or only slightly larger than, the median occipital shield, the former narrower in front, the latter attenuate behind; posterior occipitals elongate, each being anteriorly in contact with the 4th supraciliary and the small shield following it, or sometimes it also touches an additional small shield placed obliquely behind that small posterior supraorbital; two scales, touching on each side the posterior occipitals, are enlarged; other head shields regular, as usual in *Riopa,* (they are indicated in the figure). The upper labials are sometimes 8 instead of 7, the 3rd or 4th being occasionally divided. Lower eyelid with a large translucent shield. Ear small, sometimes one or the other of the front scales slightly projects in the space. Scales in 22 longitudinal rows round the middle of the body, those on the lower side scarcely larger than those on the back; the two median preanal shields are only very little larger than those superseding them; 65-70 transverse rows between fore and hind-limbs.

Limbs very short and rather stout, with very short toes and distinct claws; palm and sole coarsly granular. The fore limb when laid forward does not reach the ear, and is only a little longer than the lateral gape of the mouth. The hind-limb equals the distance between the ear and the tip of snout, or it is a trifle longer.

Colour, above, uniform brown or greyish brown, pale at the sides, and whitish or brownish white below, the brownish or yellowish tint being especially conspicuous on the lower side of the tail. There is no lateral streak at the side of the body, but the sutures between the dorsal scales are in young specimens conspicuously darker than the rest, and form longitudinal dark lines, which in mature specimens become indistinct, or obsolete. In some specimens there is also a transverse, submarginal, dark line to each scale.

Usual size about 4 inches, of which the tail is generally somewhat less than one half. Length of head and body of the largest (figured) specimen 2.25 inches.

Hab. Pegu, British Barma.

Riopa cyanella. Body slender, with a conical head. Head-shields quite similar to those of the last species, but the vertical is somewhat longer and more slender; the median occipital is conspicuously smaller than one of the anterior pair; scales adjoining the posterior occipitals moderately enlarged. Lower eyelid with a translucent large shield. Opening of the ear small, a front scale very little projecting into the space. Scales of body in 22 longitudinal rows, 60-64 transverse rows between fore and hind limb; preanals scarcely larger than the preceding scales. Limbs of moderate

* Theobald in his original description rightly places particular stress upon this character.

length and slender. The fore-limb, when laid forward, nearly or fully reaches the opening of the ear, and is only a little shorter than the distance between the snout and the ear; the hind limb is less than half the distance between the axil and loin, and it barely exceeds the distance between the fore limb and the anterior angle of the eye.

Colour, above, olive brown, with an iridescent blue tinge, purer brownish on the tail, pale brownish olive at the side of the body; each scale, above and at the sides, is indistinctly mottled with dark, and there are generally a few white spots on the side of the neck and about the shoulder; a narrow white, slightly black margined band rises from behind the orbit and continues on each side of the back; it becomes indistinct in the middle of the body, but is again slightly more conspicuous above the hip, gradually disappearing on the tail, which is indistinctly speckled with dark brown at the sides; limbs above with longitudinal, broken up, dark lines; chin and anterior neck below yellowish, vent whitish; tail below brownish white.

This description is drawn up from a specimen which was presented to the Indian Museum by Mr. W. Theobald, and is not unlikely the same which he in his Catalogue of Burmese Reptiles noticed under the name of *R. Bowringi.* The greater length of the limbs and the coloration readily distinguish this from the preceding species.

Hab. Pegu; British Barma.

RIOPA ALBOPUNCTATA, (I. R., p. 92).

Pl. v, fig. 6, 6*a*, upper and side views of head, enlarged.

RIOPA HARDWICKII, (I. R., p. 92).

Pl. v, fig. 5, 5*a*, same views as in figure 6.

RIOPA PUNCTATA, (I. R., p. 93).

The differences in structure between these three species are very few. In the first and third the vertical and the median occipital shield are comparatively narrower and longer, than in the second.

In *R. albopunctata* the scales of the body are slightly smaller and more quadrangular, the number of longitudinal rows varies between 26 and 28, (the two numbers being almost equally common, at least in Bengal specimens), the transverse rows between fore and hind limb vary between 50-60, 56 being the most usual number, as stated by Günther. The fore leg reaches, when laid forward, to the front edge of the ear, or a little beyond it, rarely to the angle of the mouth; the length of the hind leg is generally a little less than ¼th of the body, rarely exactly ¼th.

In *R. Hardwickii* all the scales are somewhat larger and more transversely elongate, the number of longitudinal rows varies between 24 and 26, both being almost equally common; the transverse rows between fore and hind limbs vary between 48 and 56, 53 being the most usual

number; the fore leg extends generally somewhat beyond the ear, and often as far as the angle of the mouth, but very rarely beyond it; the hind leg is generally somewhat more than one fourth the length of the body.

In the form, greater or lesser thickness, and in the length of the body and of the tail, the two first mentioned species are identical, and equally variable; both have in front of the ear two lobules, the upper of which is the larger one, while the lower becomes occasionally obsolete. Both species also have the shields on the preanal edge slightly larger than those above them, and both have the lower eyelid covered with enlarged shields, but in the former the centre large shield is opaque, and generally broken up in two or three smaller ones, while in the latter it always remains entire, but it is generally only in young specimens perfectly transparent. The usual size of either species is a little above 4 inches, the tail if normal being about equal to the length of the body, but often it is reproduced, becoming thinner, or thicker, and shorter, and with the subcaudals often somewhat enlarged. The coloration is generally tolerably distinct in the two species.

In *albopunctata* of South India the back is often uniform brown; in Bengal specimens, each of the six median rows of scales of the back has a black dot, forming longitudinal lines and continuing on the tail, the extreme edges of the upper back are sometimes pale coloured, and some varieties of this type occasionally very much resemble those of *Hardwickii;* sides purplish black, spotted with white; lower side of the tail uniform white, like the vent, or more often each scale with a blackish dot. Legs above black spotted.—This species extends from South India through Central India, the whole of Bengal, into N.-Eastern Asám, and westwards into Pégu. At Calcutta it is very common during the winter months, but I have seen extremely few specimens in the time between May and the end of the rainy season.

R. Hardwickii is more variable in colour. The back and sides of the body are sometimes entirely purplish black; the edges of the upper back from the nostril, and the whole of the lower side purely white, tail vermilion in young, pale brownish above, white below, in older specimens. Other specimens, particularly those from Northern India, (about Agra and northwards towards the base of the Himalayas), have the four median rows of dorsal scales each with a large blackish spot, or rather the spots are generally situated on the suture between each two scales, and the scales in the two middle rows have their lower margins apparently serrated; the upper edges of the back have the usual white or yellowish bands; the sides are above purplish black, further down paler and each scale has a black spot; white dots occur either over the entire side. or only on the anterior half, or they are restricted to the side of the neck; vent always uniform white; tail with a black spot to each scale, sometimes absent on the lower side, its general colour fleshy. The reddish or purplish tinge is gradually lost in spirit.—This species is found in South India,* extending

* According to Blyth also in Ceylon.

through Central India northwards as far as Rurki and Hardwár, and eastwards as far as Calcutta, but it is very rare here. I have only within the last year obtained two specimens on the western side of the Hughli river at Howrah, but do not know of any record of the species eastward of the Hughli, that is even in Calcutta itself.

A third species which I have to notice is Linné's *R. punctata* from South India and the Dakhin (Dekhan). The structure and colour of this closely corresponds with that of *albopunctata* from Bengal, but the difference in size is very great, the former often attaining 12 inches. The number of scales round the body is usually 24, and those between fore and hind limb 78—84. Colour, brown above and at the sides, pale below, all scales with blackish, and the anterior half of sides with white, spots.

At Matheran near Bombay (about 2,500 feet on the trappean plateau) I have met with a peculiar form, which might be looked upon as a hybrid or a transitional form, between *R. albo punctata* and *R. Hardwickii*. The form of the body, its structure, proportions of the limbs and the posteriorly narrowed vertical shield best agrees with *punctata*, as described. The largest specimen measures only 7½ inches, the body being 3¼ inches. Of eight specimens examined, all have 26 longitudinal rows of scales, a number tolerably common in *Hardwickii*, but rarely to be met with in typical *punctata*. There are 74—80 transverse rows of scales between the limbs, agreeing with *punctata*. The colouration is exactly the same as in a pale *R. Hardwickii*: above and at the sides more or less dark brown, a pale brown or yellowish band on each side from the snout to the base of the tail, anterior half of sides of body with white dots; below whitish; all scales have blackish spots which sometimes become obsolete on the lower side. It is really difficult to decide to which species this particular form, which I have just noticed, should be referred. The structure and form of the body agrees best with *punctata*, while the colouration is that of *Hardwickii*, and the size is intermediate between both. To consider the Matheran form as an independent species, seems to me quite unnatural; it is certainly nothing else than a local variety, and most probably the same which Jerdon notices as *R. Hardwickii* from the Carnatic, '9 inches' long (J. A. S. B., xxii, p. 478). The question to be answered is: do we know the young *punctata* in all its progressive stages up to the adult? I got the adult from Púna, and with it one younger specimen which has the general colouration of *Hardwickii*, the body is 2·6 inches, greater than in any known *Hardwickii* from the N. West or Central Provinces, tail reproduced, short, 24 longitudinal rows round the body, and 80 transverse rows of scales between the limbs. If we have to look upon this specimen as the young of *punctata*, what I do not doubt it really is, and take into consideration what I said about true *Hardwickii* and the Matheran form, the only reasonable conclusion we can draw is, that *punctata* and *Hardwickii* are actually only one species which

attains its greatest size and development on the Gháts of South India, and gradually diminishes in size as it extends further north, and into the plains. Careful observations of the younger stages of *punctata* must settle this presently doubtful point, but it is one of extreme interest for the study of the development of our Indian fauna.

CHIAMELLA LINEATA, Gray.

Gray, Cat. Lizards B. R., p 97.—Günther, I. R., p. 95.

I obtained an adult specimen* of this very rare form near Púna (Dakhin), on the sandy banks of the river between shrubs.

Body very slender and long, muzzle moderately obtuse, head flattened above. Rostral shield broader than high, slightly reaching to the top of head. Anterior frontal large, single; posterior frontals small, separate; vertical small, in contact with anterior frontal, angular in front, obtusely rounded (sub-eliptically) behind; supraciliaries four; anterior occipitals united into one obtusely triangular shield, median occipital small, pointed behind and the posterior occipitals elongate, forming a suture posteriorly. Nostrils lateral, in a single elongate shield; supranasals narrow, separated by the anterior frontal which is in contact with the rostral. Two loreals. Lower eyelid transparent. Seven upper labials, fifth largest and under the orbit; six lower labials. Ear small, with smooth edges. Scales perfectly smooth, shining, in 22 longitudinal rows round the middle of the body, and in 82-84 transverse series between the limbs; preanals and subcaudals not perceptibly enlarged. Limbs very short, each with four toes, the inner toes on both very small, the fourth toe on the fore-limb is only a little longer than the second and sensibly shorter than the fourth; on the hind-limb the third is very little longer than the fourth. When laid forward the anterior limb does not reach the ear, and the hind-limb is equal to one sixth the length between it and the fore-limb.

Colour, above, iridescent bright golden brown, sides paler with a greenish tinge, lower side whitish; all scales with blackish median spots, forming continuous lines above, but they are slightly more interrupted at the sides and on the belly, and are least distinct on the throat; head shields marbled with dark; edge of lips yellowish; limbs and tail similarly striped as the body.

Gray's characteristic of the genus is excellent, with the exception that the contiguity of the supranasals cannot be considerate of generic value. My specimen measures 4·3 inches, body 2· (head alone 0·2), tail 2·2, reproduced towards the tip; fore-limb 0·2, hind-limb very nearly 0·3 inch.

* The only type specimen in the British Museum is a young one, and its proper locality was unknown.

On the Osteology of Triænops persicus,—*by* G. E. Dobson, B. A., M. B., *Assistant Surgeon, H. M.'s British Forces.*

(With plate VI.)

[Received and read 6th March, 1872.]

The construction of the bony skeleton shows a closer relationship with *Phyllorhina* than expected by me, when writing my description of the genus, founded on the typical species of which I had not then obtained a perfect skeleton.

The genus is connected with *Phyllorhina*, principally, in the relative number and length of the bones of the fingers, supporting the wing membrane; in the relative number and length of the bones of the toes; in the shape of the iliac bones; and less markedly in the flattened form and vertical height of the nasal bones. In some other respects, especially in the form of the bones entering into the construction of the *basis cranii*, and in their foramina, its relations are more closely with *Rhinolophus*, while it differs from both genera, not less importantly, in some peculiarities of structure to be described hereafter.

I shall, therefore, in describing the bones of the skeleton compare them generally with those of the species of *Phyllorhina* and *Rhinolophus*, and particularly with those of *Ph. larvata*, Horsf., portions of the skeleton of which are figured in the accompanying plate for the purpose of comparison.

In its general outline the skull resembles that of *Phyllorhina* more closely than *Rhinolophus*, especially in the flattened form and less vertical height of the nasals, which are, however, relatively, much more developed laterally and vertically, than in the former genus. From both genera it differs remarkably in the form of the zygomata which are greatly compressed, and expanded in a vertical direction.

The superior margin of the zygoma rises vertically to a height of 0·15 inch immediately in front of the posterior origin of the arch, maintaining this height for more than two-thirds its length, then suddenly narrowing to half near its connection with the maxillary; the inferior margin is straight, and the intervening bony structure very thin and diaphanous. The zygomata are not curved outwards, as in *Phyllorhina* and *Rhinolophus*, and their flattened arches form straight lines with the sides of the maxillæ.

The *basis cranii* is much narrower than in *Phyllorhina;* the basi-occipital is less than half the width of that of *Ph. larvata*, the total lengths of the skulls being, respectively, 0·85 and 0·95 inches.

The following table of dimensions shows the principal measurements of the skulls in *Tr. persicus* and *Ph. larvata*:—

	Tr. persicus inches.	*Ph. larvata* inches.
Extreme length of skull,........................	0.85	0·95
Breadth between upper margins of zygomata,	0·30	0·50
Breadth across nasal prominences,...............	0·28	0·28
Greatest vertical height of zygoma, ...	0·15	0·10
Length of zygoma, ...	0·18	0·23
Length of bony palate, laterally, ...	0·24	0·23
Width of basi-occipital between the cochleæ,...	0·04	0·10
Length of base of skull from posterior margin of palate to edge of foramen magnum, ...	0·37	0·43
Width of the base of the skull behind posterior roots of zygomata, ...	0·32	0·42

The auditory *bullæ osseæ* are very large and prominent; the cochleæ are deeply grooved externally by the intervals between the spiral chambers, contrasting with the smooth external surface of the much less prominent cochleæ of *Phyllorhina*, and resembling more closely the same parts in *Rhinolophus.*

The par-occipital processes are long and slender, club-shaped, narrow above, expanded beneath, directed downwards and slightly forwards, terminating in a small, acutely pointed projection directed forwards, supporting the inferior surface of the petro-mastoid. In *Phyllorhina* the par-occipital processes are very short and blunt; in *Rhinolophus* long and slender, directed downwards and forwards, slightly thickened beneath.

There is a minute precondyloid foramen on each side, and in front of, and external to it, a wide opening—having for its anterior boundaries the petro-mastoid and cochlea—the jugular foramen. There is no distinct carotid foramen. In *Phyllorhina larvata* the precondyloid foramen is separated from the jugular opening by a considerable interval; the latter is small, circular, and occupies the angle between the petro-mastoid and cochlea.

The basi-sphenoid is perforated, posteriorly, in the middle line by an oval aperture, a defect of ossification, represented in *Phyllorhina* by a circular thinning of the roof of the *basis cranii* in the same situation. Between this aperture and the glenoid fossa is a circular opening, the foramen ovale, placed posterior and slightly external to the sphenoidal fissure. More posteriorly and externally, behind the glenoid fossa, separated from the petro-tympanic bulla by a narrow bony process, a large post-glenoid foramen exists, while immediately external to and above it the squamosal is perforated by a small venous canal directed upwards.

The roof of the meso-pterygoid fossa is pierced posteriorly by two small foramina placed one on each side of the middle line, and separated by an exceedingly narrow bony lamella, and similarly in front, near the junction

of the basi-sphenoid with the pre-sphenoid. The cribriform plate is perforated by two large triangular foramina separated by a narrow bony process.

The pterygoid plates are greatly expanded, forming broad, acutely pointed, triangular projections directed downwards and slightly outwards, giving width to the meso-pterygoid fossa which quickly narrows as it proceeds backwards, exposing the wide sphenoidal fissures. Posteriorly its roof becomes continuous with the under surface of the *basis cranii*, as in *Phyllorhina*, its sides curve outwards, forming the posterior boundaries of the sphenoidal fissures which extend backwards as far as a line drawn between the glenoid fossæ. There is no distinct foramen rotundum.

In *Phyllorhina* the sphenoidal fissures are much narrower and shorter, terminating posteriorly at some distance in front of a line joining the glenoid fossæ. They are concealed in their whole extent by the lateral walls of the meso-pterygoid fossa. The foramen rotundum is represented by a small aperture in front of, and internal to the foramen ovale which occupies the same position, relatively, as in *Triænops*. The post-glenoid foramen is small or absent. The meso-pterygoid fossa maintains the same width from before backwards, or is slightly expanded posteriorly. About the middle its lateral walls develop small, acutely pointed, hamular processes, curved backwards.

In *Rhinolophus* the basi-occipital is extremely narrow between the auditory bullæ; the foramen rotundum is united, as in *Triænops*, with the sphenoidal fissure which extends as far backwards as in the latter genus; the meso-pterygoid fossa is relatively wider anteriorly than in either *Phyllorhina* or *Triænops*, and conceals the narrow sphenoidal fissures to within a short distance of its termination where its sides suddenly narrow, disclosing the sphenoidal fissures posteriorly, and slightly further backwards curving outwards limit their posterior extent; its roof is traversed by a narrow groove terminating posteriorly in an excavation, thus differing from both *Phyllorhina* and *Triænops*.

The bony palate extends as far back as the middle of the last molar tooth; in *Phyllorhina*, it is limited by the posterior margin of the second molar.

The coronoid process of the mandible is very small, and in vertical height less than the canine tooth, thus resembling *Rhinolophus* more than *Phyllorhina*; the upper margin of the articular surface is level with the summits of the molar teeth, and the ramus is pierced immediately beneath and in front of the condyle by a large circular foramen directed upwards, and slightly outwards.*

* This infra-condyloid foramen of the mandible is probably unique in *Triænops*, in no other genus of *Rhinolophidæ* have I found it, nor, so far as I can ascertain has such a foramen been discovered in any other species of *Chiroptera*.

In *Ph. larvata* the coronoid process of the mandible exceeds the canine tooth considerably in vertical extent, and the upper margin of the condyle is raised above the summits of the molar teeth.

The dental formula corresponds with that of *Phyllorhina* :—

In. $\frac{2}{4}$; c. $\frac{1-1}{1-1}$; p. m. $\frac{2-2}{2-2}$; m. $\frac{3-3}{3-3}$.

The upper incisors are deeply bifid, and, as in all genera of *Rhinolophidæ*, minute, placed near each other in the centre of the space between the canines at the extremities of rudimentary premaxillæ suspended in the nasal cartilages. The upper canine has a well developed, acutely pointed talon behind, in front a raised ridge extending nearly half its vertical extent and terminating in a small blunt projection. The first upper premolar is minute with a slightly concave crown, it is placed outside the tooth-row; the last molar is considerably more developed than in *Phyllorhina* and resembles that of *Rhinolophus*, equalling, in the antero-posterior diameter of its crown, more than three-fourths the second premolar, while in *Ph. larvata*, *Ph. nobilis*, and other species of *Phyllorhina*, it is less than half.

In the lower jaw the incisors are deeply bilobed; a faint indication of a third lobe is discernible with the aid of a lens, on the outer side of the outer incisor.

The first premolar has the cingulum largely developed, expanded horizontally on all sides, and sending upwards, anteriorly and posteriorly a small process, so that the tooth appears, at first sight, tricuspidate. The posterior process is much more vertically extended than the anterior one.

The third molar equals the second in size, contrasting with the imperfectly developed last molar of *Phyllorhina*.

The manubrium sterni differs remarkably from that of *Ph. larvata* which may be taken as characteristic of the form of this bone in *Phyllorhina*. The lateral processes behind the sterno-clavicular articulation are triangular and acutely pointed, contrasting with the irregularly blunt processes of *Ph. larvata*; the carina is greatly developed, forming a deep, quadrilateral projection arising from the entire length of the bone. The second sternal bone is provided with a deep triangular projection, the anterior margin of which is separated from the posterior margin of the carina manubrii by a wide triangular space; behind, the projecting posterior angle conceals the junction of the third sternal bone. The third bone is small, narrow, and spine-like; its posterior extremity supports a thin, semicircular cartilage.

In *Phyllorhina* the carina manubrii is shallow, forming a slightly raised ridge for more than two-thirds its length; in the anterior third it is produced into a blunt spine. The second sternal bone develops a shallow keel along its entire length; the third bone is short, expanded laterally, terminating in a semicircular margin.*

* This is the most usual form of the sternum in insectivorous bats. (See Blainville, Ostéographie). The number of bones here given is the number of separable bones distinguishable in the sternum of an adult specimen.

The ribs are very much flattened and separated by very narrow intervals.

The ento-condyloid tuberosity of the humerus develops an exceedingly long styloid process, directed slightly upwards, contrasting with the similar, short, blunt process of *Phyllorhina;* the ecto-condyloid tuberosity is obsolete; the articular surface is marked with a very deep sigmoid notch.

The ulva is strongly curved backwards.

The bones of the fingers exhibit nearly the same relative proportions in length as in *Phyllorhina.* The terminal phalanx of the third finger only is bifid at the extremity, as in *Cœlops Frithii.* From the proximal extremity of the same phalanx, close to the joint, on the under surface, and slightly to the outside, a process of bone, 0·15 inch long, arises, directed downwards, slightly forwards, and outwards.

The anterior portion of the ilium develops, at right angles to its inferior surface, a broad quadrilateral process of bone. The antero-inferior angle of this process is connected by a narrow bony isthmus with the ileo-pectineal spine, thus bridging over the space between, and forming the inferior boundary of a large oval opening, larger than the obturator foramen which is placed posterior to it, and, owing to the oblique position of the iliac bones, on a somewhat lower level. The rim of the pelvis thus forms a straight line from the pubic symphysis to the antero-inferior angle of the quadrilateral process on the anterior extremity of the ilium.

In *Ph. larvata,* and other species of *Phyllorhina,* the iliac bones develop very similar processes, but that rising from the antero-inferior surface of the ilium is much narrower, more of a triangular than of a quadrilateral shape, and directed downwards and slightly backwards; its antero-inferior angle is rounded off, and does not develop any spine, as in *Triænops.*

In *Rhinolophus* the *eminentia ileo-pectinea* develops a long, acutely pointed spine, not connected by bone with the antero-inferior surface of the ilium.

The fibula is complete as in other Rhinolophine bats. The toes are equal in length, each with two joints, as in *Phyllorhina* and *Cœlops.*

The genera of *Rhinolophidæ* may be arranged, osteologically, under two subfamilies as follows:—

Subfam. I. RHINOLOPHINÆ.

Toes unequal; outer toe with two, remaining toes with three joints each; ileo-pectineal spine not connected by bone with the antero-inferior surface of the ilium.

Genus. 1. *Rhinolophus.*

Metacarpal bone of fourth finger exceeding that of second finger in

length; foramen rotundum united with sphenoidal fissure; roof of mesopterygoid fossa with a longitudinal groove terminating in an excavation posteriorly; basi-occipital between auditory bullæ very narrow, in most species linear; par-occipital processes slender, produced; antero-posterior diameter of last molar equal to more than three-fourths that of antepenultimate molar; premolars $\frac{2-2}{3-3}$.

Subfam. II. PHYLLORHININÆ.

Toes equal, with two joints each; ileo-pectineal spine united by bone with a process derived from antero-inferior surface of ilium.

Genus. 2. *Phyllorhina.*

Metacarpal bone of fourth finger less than that of second finger in length; foramen rotundum distinct; auditory bullæ separated by a broad basi-occipital; roof of mesopterygoid fossa continuous with under surface of the *basis cranii*, not grooved, nor perforated by foramina; par-occipital processes short, blunt; zygomata narrow, slightly expanded posteriorly, curved outwards; antero-posterior diameter of last molar less than half of the antepenultimate molar; premolars $\frac{2-2}{2-2}$, or $\frac{1-1}{2-2}$.

Genus. 3. *Triænops.*

Metacarpal bone of fourth finger less than that of second finger in length; foramen rotundum united with sphenoidal fissure; basi-occipital between auditory bullæ narrow, not linear; roof of mesopterygoid fossa pierced by foramina, not grooved, continuous posteriorly with under surface of *basis cranii;* par-occipital processes long, slender; zygomata greatly expanded vertically, not curved outwards; last upper molar equal to three fourths of the antepenultimate molar; mandible pierced by an infra-condyloid foramen; premolars $\frac{2-2}{2-2}$.

Genus. 4. *Cœlops.**

Metacarpal bone of index finger very long, extending beyond the first phalanx of the second finger; metacarpal bone of fourth finger exceeding that of second finger in length; basi-occipital broad between auditory bullæ; zygomata slender, curved outwards; last upper molar equal to three-fourths of the antepenultimate molar; tail very short or absent; premolars $\frac{2-2}{2-2}$.

Explanation of plate vi.

Figs. 1-9. *Triænops persicus,* Dobson. 1. Side view of skull; 1*a*, base of skull; 1*b*, lower jaw; all enlarged double the natural size; 2, scapula, double size; 3, side view of thorax, showing the very prominent *carina sterni,* enlarged double natural size; 4, 4*a*, distal extremity of humerus, enlarged four times the natural size; 5, third

* Type *Cœlops Frithii,* Blyth, Journ. As. Soc. Bengal. Dr. W. Peters has noted the relations of this genus with *Phyllorhina.* (See Monatsber. Berlin Akad., 1865, p. 644, and also for 1871).

finger showing peculiar form of terminal phalanx, enlarged double natural size; 6, proximal third of forearm, enlarged double; 7, front view of pelvis; 8, side view of pelvis, both enlarged double; 9, tibia and fibula, enlarged double.

Figs. 10-14, *Phyllorhina larvata*, Horsfield. 10, 10*a*, 10*b*, side and base of skull with lower jaw, all enlarged double natural size; 11, side view of thorax, double size; 12, 12*a*, distal extremity of humerus enlarged about three times the natural size; 13, proximal third of forearm, enlarged double; 14, side view of pubic and iliac bones, enlarged double.

Third List of Birds obtained in the Khasi and Garo Hill ranges, with some corrections and additions to the former lists,—*by* Major H. H. Godwin-Austen, F. R. G. S., *Deputy Superintendent, Topographical Survey of India.*

[Received 10th December, 1871.]

23.* *Micronisus badius*, Gmel. Foot of Garos.

211. *Chrysococcyx Hodgsoni*, Moore. Garo Hills.

234. *Arachnechthra asiatica*, L. Bologunj.

297. *Alseonax latirostris*, Raffles. Garo Hills.

304. *Cyornis rubiculoides*, Vigors.

312. *Muscicapula sapphira*, Tickell. Shoton Dorengo Peak, Garo range.

318. *Siphia tricolor*, Hodg.

350. *Zoothera monticola*, Blyth.

358*a*. *Turdus dissimilis*, Blyth. *T. hortulorum* of Sclater. Garo Hills.

399*a*. *Pellorneum palustræ*, Jerdon, n. sp. Obtained in the beels between Bolagunj and Chatak.

468. *Iora typhia*, Linn.

453. *Ixos tristis*, Blyth.

476. *Kittacincla macroura*, Gmel.

519. *Dumeticola affinis*, Hodg. Banks of Megna, Sylhet.

522. *Tribura luteoventris*, Hodg.

544. *Drymoipus longicaudatus*, Tickell.

547. *Suya criniger*, Hodg.

562. *Phylloscopus indicus*, Jerdon. Base of Garos.

594. *Budytes citreoloides*, Hodg.

693*a*. *Calornis affinis*, Walden.

704. *Estrelda amandava*, Linn.

738. *Carpodacus erythrinus*, Pallas.

829. *Coturnix communis*, Bonaterre. Cherra Punji. October.

904. *Gallicrex cristatus*, Latham.

* Numbers same as in Jerdon's Birds of India.

941. *Threskiornis melanocephalus*, Linn. In this specimen all the quills are pure white. Shot in Mymensing in February.

The following alterations in nomenclature have to be made in my former papers.

358. *Turdus chrysolaus*, ♀ recorded as from Cherra Punji, proves, on further comparison, to be *Turdus pallens*, Pallas. *T. dissimilis*, Blyth, is very close to this last, but may be known at once by the very rich rufous colouring on the sides of the breast and lining of the wings, it also wants the pale supercilium of *T. pallens*. The bill is far stronger, of greater length, and pale yellow in colour.

396. *Timalia pileata*, Horsf., is the Java species, and our Indian bird differs somewhat. On comparing my specimens with the true *T. pileata* in Lord Walden's collection, the difference was at once apparent, a fact anticipated by Lord Walden at the time the comparison was made. I propose that our bird should be called *T. Bengalensis*. The Indian form differs from the Javanese, in the white on the forehead being larger, of darker brown on the head, the darker tint of the back, and decidedly darker hue of the tail. In size there is no perceptible difference. It is an interesting instance of a race changing on its extreme limits.

146*a* and 146*b* are both *Rhyticeros plicatus;* the first being the female, the second the male.

146*c*. *Anorhinus galeritus* Dr. Jerdon now pronounces to be a new species altogether, and he will describe it under the name of *A. Austeni*. I shot the bird in the N. Cachar Hills near Asalu.

141. *Hydrocissa coronata*, is *albirostris*, the large variety, named by Hutton *affinis*, from the Deyra Doon.

405, (in 2nd list of birds), *Pomatorhinus erythrogenys* should be *P. hypoleucos*, Blyth, originally described from Arakan.

231*a*. *Anthreptes ?* is *Chalcoparia Singalensis*, Gmelin.

With reference to some notes on my first paper by Mr. A. O. Hume, where he says that 139, *Serilophus rubro-pygea* with the collar of shining white must be the other species *S. lunatus*, I must remark that my two specimens are identical in every point, only that one has the collar well developed, in the other it is scarcely perceptible. *S. lunatus* I never got, the points of difference between the two species are well marked especially in the outer tail feathers and general hue throughout the upper parts.

London, Novb. 1871.

On Differential Galvanometers,
by Louis Schwendler, *Esq.*

There is one very interesting question connected with the construction of these instruments which, as far as I know, has not yet been answered, and which is of sufficient practical importance to form the subject of an investigation.

This question may best be put as follows:

*A certain battery of given electromotive force and given internal resistance has to supply the two coils of any differential galvanometer with a current; what must be the resistance of either coil in order to obtain the most delicate reading when measuring a given resistance?**

The solution of this problem in its most general form would naturally be extremely intricate, and could not be effected without tedious calculation, but there is one special case where it is comparatively easy to determine the law which connects the resistance of the coils with the external resistances to be compared, in order to have the greatest sensitiveness of the instrument.

Suppose for instance that the two coils of a differential galvanometer have equal resistances and equal magnetic momenta, and further that the battery which supplies the two coils with current has an internal resistance sufficiently small to allow of its being neglected against the resistances to be compared. Then, on account of the battery resistance being so small, it follows that the current through one coil is entirely independent of the total resistance in the other, and as the two coils are supposed to have equal magnetic momenta and equal resistances, balance can only be established by the currents becoming equal, that is to say at or near balance each coil must receive a current

$$C = \frac{E}{g + w}$$

where g is the unknown resistance of either coil,

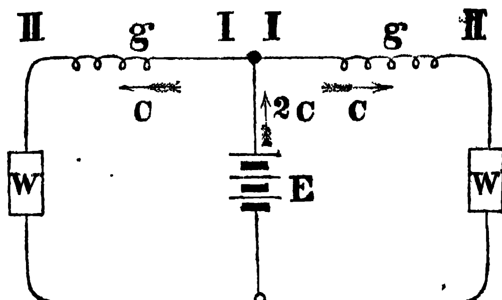
w the resistance to be measured, and which is supposed to be known,

and E the given electromotive force of the testing battery.

At balance the diagram of this differential galvanometer is, therefore, represented by Fig. 1.

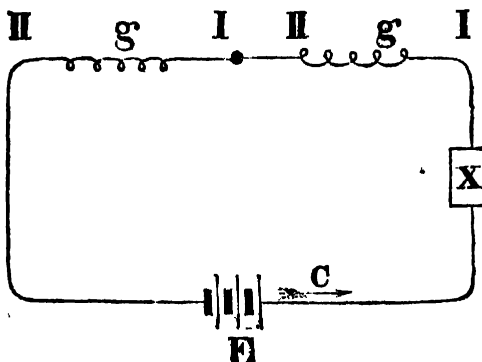
* In the Philosophical Magazine of May, 1866, and January, 1867, I solved a similar question, *viz.* the proper resistance of the galvanometer to be employed when testing by Wheatstone's balance, and the result of that investigation has led me to examine the present question.

Fig. 1.



Now, as far as the magnetic effect of the two coils is concerned, we may substitute for the parallel circuit, Fig. 1, the simple circuit, Fig. 2, if we only reverse the magnetic action of one of the two coils, (say the right one).

(Fig. 2).



And in order to have, in this case, for the same electromotive force E the same current C flowing through the coils as before, (see Fig. 1), we must necessarily introduce a resistance x hence—

$$C = \frac{E}{g + w} = \frac{E}{2g + x}$$

therefore $w = g + x$ .... (I)

But to obtain the maximum magnetic effect in any single circuit (Fig. 2), it is necessary that the resistance of the coil should be equal to the total external resistance* and therefore in this case (Fig. 2)

$x = 2g$.......................... (II)

Eliminating x from equation I and II we have

$g = \frac{w}{3}$.......................... (I)

To obtain the most delicate reading with a differential galvanometer, the two coils of which have equal magnetic momenta, and also equal resistances,

* This law holds good,—as can easily be shown,—for any number of coils connected into a single circuit, no matter if the magnetic effects of these coils have the same or opposite sign with respect to a given magnetic point.

the resistance of each coil should always be the third part of the resistance to be measured.

This relation is so exceedingly simple that at first I thought it must be a well known one, and that I only was unacquainted with it. However, I have since carefully read the literature on the subject, and I find the above law nowhere stated, and as a further proof of its being new, I may add that none of the differential galvanometers with which I have had occasion to deal, fulfil it. That this relation is of the greatest importance in the construction of differential galvanometers cannot be doubted, and I have accordingly thought it worth while to bring my investigation before the Society.

Solution of the Problem in its most general form.

Fig. 3.

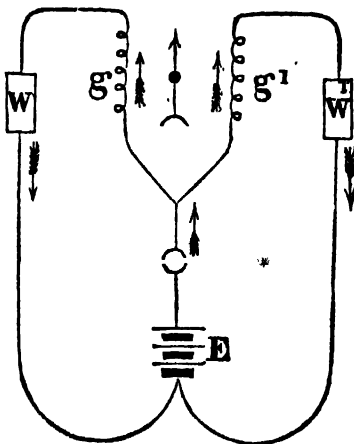


Fig. 3 gives the diagram of a differential galvanometer in its general form. w and w' are the two resistances to be compared and which we suppose to be given. E is the given electromotive force of the testing battery, and f the total resistance in the battery branch ;— g and g' are the resistances of the two coils, and their values are to be determined under the condition that the reading, when near balance, is most delicate, *i. e.* that the slightest variation in w or w' causes the greatest possible variation in the deflection of the needle.

The magnetic moment of the coil g, when a current G passes through it, may be designated by Y, and the magnetic moment of the coil g', when a current G' passes through it, may be called Y′. Both these magnetic momenta are taken with respect to the same needle, or system of needles, and we may suppose that neither Y nor Y′ alter perceptibly, when the needle, or system of needles, slightly alters its position towards the coils, which are supposed to be fixed. (This condition will be fulfilled as closely as possible near balance, when the needle is approximately always in the same position with respect to the coils, and it is only for such a case that the following investigation is of any practical interest).

According to the principle of the differential galvanometer, we have—

$$a^\circ \propto Y - Y'$$

where a represents the deflection of the needle, before balance is arrived at,

and which may be positive, zero or negative, depending on the relative strength of the currents which at the time are acting through the coils, on the relative position of the needle towards the coils, and on the shape and size of the latter.

Approximately we have further

$$Y = m \; U \; G$$
$$Y' = m' \, U' \, G'$$

U and U′ being the number of convolutions in the coils g and g' respectively, and m, m' representing the magnetic momenta of an average convolution (one of mean size and mean distance from the needle) in the coils g and g' respectively, when a current of unit strength passes through them.

Further, as the space of each coil to be filled with wire of constant conductivity is given, we have—

$$U = n \sqrt{g}$$
$$U' = n' \sqrt{g'}$$

as can be easily proved.

n and n' are quantities independent of g and g', so long as it may be allowed to neglect the thickness of the insulating covering of the wire against its diameter, which for brevity's sake we will suppose to be the case. With this reservation n and n' depend entirely on the size of the coils and on the manner of coiling.

Substituting these values, we get

$$a^\circ \propto m \, n \sqrt{g} \; G - m' \, n' \sqrt{g'} \; G' \; \ldots\ldots\ldots\ldots \quad I$$

which general expression for the deflection we may write in two different forms either

$$a^\circ \propto m \, n \sqrt{g} \left(G - \frac{m' \, n'}{m \; n} \, \frac{\sqrt{g'}}{\sqrt{g}} \, G' \right) \ldots\ldots \quad I$$

or

$$a^\circ \propto m' \, n' \sqrt{g'} \left(\frac{m \; n}{m' \, n'} \, \frac{\sqrt{g}}{\sqrt{g'}} \, G - G' \right) \; \ldots \quad I'$$

which means that any deflections observed may be naturally considered due to either coil. In the first form (equation I) it is considered due to the coil g, when a current G $\frac{m' \, n'}{m \; n} \frac{\sqrt{g'}}{\sqrt{g}}$ G′ flows through it, in the latter form (equation I′) it is considered due to the coil g', when a current $\frac{m \; n}{m' \, n'} \frac{\sqrt{g}}{\sqrt{g'}}$ G · · G′ flows through it.

Now considering that the same battery E has to supply the current to both the coils we have

$$G = E \, \frac{g' + w'}{N}$$

$$\text{and } G' = E\,\frac{g+w}{N}$$

where $N = (g+w)\,(g'+w') + f\,(g+w+g'+w')$.

Thus substituting in I and I′ we get either

$$a^{\circ} \propto m\,n\,E\,\frac{\sqrt{g}}{N}\Big(g'+w' - \frac{m'\,n'}{m\,n}\,\frac{\sqrt{g'}}{\sqrt{g}}\,(g+w)\Big) \;\ldots\ldots\ldots\ldots\; \text{I}$$

$$\overbrace{}^{\Delta'}$$

$$a^{\circ} \propto m'\,n'\,E\,\frac{\sqrt{g'}}{N}\Big((g'+w')\,\frac{m\,n}{m'\,n'}\,\frac{\sqrt{g}}{\sqrt{g'}} - (g+w)\Big) \;\ldots\ldots\ldots\; \text{I}'$$

and either Δ or Δ' is the factor which at balance becomes zero.

The coefficient $\frac{m'\,n'}{m\,n}\,\frac{\sqrt{g'}}{\sqrt{g}}$ means, therefore, nothing else than what is generally called the constant of the differential galvanometer, *i. e.*, the number by which the total resistance in one branch of the differential galvanometer has to be multiplied, in order to obtain the total resistance in the other branch, when balance is established. This constant of the differential galvanometer is a given function of g and g', the resistance of the coils, and as g and g' are to be determined, by being variable, it cannot be considered a constant in this investigation. But the factor $\frac{m'\,n'}{m\,n}$ is entirely independent of any of the resistances, it represents what may appropriately be called the '*mechanical arrangement*' of the differential galvanometer, and may be designated by p. It must be borne in mind that p represents an absolute number, which theoretically may be anything with the exception of o and ∞. If p has a value equal to either of these two limits, the instrument would be a simple galvanometer with a shunt, and not a differential galvanometer.

The deflection a may now be written more simply, as follows:—

$$a^{\circ} \propto K\,\frac{\sqrt{g}}{N}\Big(\overbrace{g'+w' - p\,\frac{\sqrt{g'}}{\sqrt{g}}\,(g+w)}^{\Delta}\Big) = K\,\frac{\sqrt{g}}{N}\,\Delta \;\ldots\ldots\ldots\; \text{I}$$

$$\Delta'$$

$$\text{or } a^{\circ} \propto K'\,\frac{\sqrt{g'}}{N}\Big(\frac{g'+w'}{p}\,\frac{\sqrt{g}}{\sqrt{g'}} - (g+w)\Big) = K'\,\frac{\sqrt{g'}}{N}\,\Delta' \;\ldots\ldots\ldots\; \text{I}'$$

K and K′ being independent of g and g', and also of w and w'.

N is a known function of all the resistances in the differential circuit.

Δ and Δ' are similar functions of g and g', w and w', and which functions become both zero at balance.

For the further investigation, only one of the two possible expressions of a will be used, *viz.* equation I.

$$a^\circ \propto K \frac{\sqrt{g}}{N} \Delta$$

Differentiating this expression with respect to w', the external resistance belonging to the coil g', we get

$$\frac{da}{dw'} = K \left\{ \frac{\sqrt{g}}{N} - \frac{\Delta R \sqrt{g}}{N^2} \right\}$$

$$\text{where } R = \frac{dN}{dw'}$$

or the variation of the deflection a, when w' varies, is

$$\delta a = K \left\{ \frac{\sqrt{g}}{N} - \Delta \frac{R \sqrt{g}}{N^2} \right\} dw' = K \phi \, dw'.$$

Now it is clear that the instrument is most sensitively constructed when, for the slightest variation in w', the variation in a is greatest. This will be the case if the factor $\phi = \frac{\sqrt{g}}{N} - \frac{\Delta R \sqrt{g}}{N^2}$ is as great as possible. This factor ϕ is a known function of the resistances in the circuit, and as w and w' are given, ϕ can only be made a maximum with respect to g and g', the resistances of the two coils.

Thus our physical problem is reduced to the following mathematical one:

A function ϕ containing two variables is to be made a maximum, while the two variables are fixed to each other by the relation

$$\Delta = g' + w' - p \frac{\sqrt{g'}}{\sqrt{g}} (g + w),$$

Δ being a constant with respect to g and g' and becoming zero at balance.

Solving this question (relative maxima), we get

$$\frac{(w-g)(w'+g') + f(w+w'+g'-g)}{p\,(g-w)\,g'} = \frac{2\,(g+w+f)}{2\sqrt{g}\sqrt{g'} - p\,(g+w)} \quad \ldots \text{II.*}$$

* To some of the readers, a more detailed working out of the mathematical problem may, perhaps, be welcome; and as this will also prove to be an easy control over the equations (11) and (11′), I will give it here in a somewhat condensed form. We had

$$a^\circ \propto K \frac{\sqrt{g}}{N} \Delta \,..$$

where K represents a constant, *i. e.* a quantity independent of any of the resistances in the differential circuit (Fig. 3), while $\Delta = g' + w' - p \frac{\sqrt{g'}}{\sqrt{g}} (g + w)$, *i. e.* a resistance which at balance becomes $= 0$; and further

$$N = (g + w)(g' + w') + f\,(g + w + g' + w').$$

Differentiating a with respect to w', and remembering that $\frac{d\Delta}{dw'} = 1$, and substituting $\frac{dN}{dw'} = R$, we have

which equation with the other

$$g' + w' - p \frac{\sqrt{g'}}{\sqrt{g}} (g + w) = \Delta = 0 \ldots\ldots\ldots\ldots\ldots 1$$

gives all that is required to determine g and g', and the values thus obtained

$$\frac{d\,a}{d\,w'} = \mathrm{K} \left\{ \frac{\sqrt{g}}{\mathrm{N}} - \Delta \frac{\mathrm{R}\sqrt{g}}{\mathrm{N}^2} \right\}$$

$$\therefore \quad \delta a = \mathrm{K} \left\{ \frac{\sqrt{g}}{\mathrm{N}} - \Delta \frac{\mathrm{R}\sqrt{g}}{\mathrm{N}^2} \right\} \delta w'$$

$$\phi$$

$$\therefore \quad \delta a = \mathrm{K}\, \phi\, \delta w'$$

Thus the variation of a is always directly proportional to ϕ, a known function of g and g', and to make δa for any $\delta w'$ as large as possible, we have to make ϕ a maximum with respect to g and g', while g and g' are connected by the following equation

$$\Delta = g' + w' - p \frac{\sqrt{g'}}{\sqrt{g}} (g + w) \ldots\ldots\ldots\ldots\ldots \mathrm{I}$$

p being a constant with respect to g and g', as also is Δ.

We have, therefore, to deal here with a relative maximum, and in accordance with well known rules, we have to form the following partial differential coefficients:

$$\frac{d\,\phi}{d\,g} = \left\{ \frac{\mathrm{N} - 2g \frac{d\,\mathrm{N}}{d\,g}}{2\sqrt{g}\,\mathrm{N}^2} - \frac{\mathrm{R}\sqrt{g}\frac{d\,\Delta}{d\,g}}{\mathrm{N}^2} + \Delta\,\mathrm{S}\right.$$

$$\mathrm{R} = \frac{d\,\mathrm{N}}{d\,w'} = g + w + f$$

$$\mathrm{S} = \frac{\sqrt{g}}{\mathrm{N}^2} \left\{ \frac{2\,\mathrm{R}\frac{d\,\mathrm{N}}{d\,g}}{\mathrm{N}} - \frac{d\,\mathrm{R}}{dg} - \frac{\mathrm{R}}{2\,g} \right\}$$

$$\frac{d\,\phi}{d\,g'} = - \left\{ \frac{\sqrt{g}\frac{d\,\mathrm{N}}{d\,g'}}{\mathrm{N}^2} + \frac{\mathrm{R}\sqrt{g}\frac{d\,\Delta}{d\,g'}}{\mathrm{N}^2} + \Delta\,\mathrm{S}' \right\}$$

$$\mathrm{S}' = \frac{\sqrt{g}}{\mathrm{N}^2} \left(\frac{d\,\mathrm{R}}{d\,g'} - \frac{2\,\mathrm{R}\frac{d\,\mathrm{N}}{d\,g'}}{\mathrm{N}} \right)$$

$$\frac{d\,\Delta}{d\,g} = \frac{w - g}{g} \frac{p}{2} \frac{\sqrt{g'}}{\sqrt{g}}$$

$$\frac{d\,\Delta}{d\,g'} = \frac{2\sqrt{g}\sqrt{g'} - p\,(g + w)}{2\sqrt{g}\sqrt{g'}}.$$

At or near balance when Δ is $= 0$, or very small, the terms $\Delta\,\mathrm{S}$ and $\Delta\,\mathrm{S}'$ in the respective differential coefficients are to be neglected, because neither S nor S′ become infinite for any finite values of g and g'.

Thus we have approximately:

$$\frac{d\,\phi}{d\,g} = \frac{\mathrm{N} - 2g\frac{d\,\mathrm{N}}{d\,g}}{2\sqrt{g}\,\mathrm{N}^2} - \frac{\mathrm{R}\sqrt{g}\frac{d\,\Delta}{d\,g}}{\mathrm{N}^2} = \mathrm{P} - \mathrm{Q}$$

would be those which would make the reading most delicate near balance, when the variation takes place in w', *i. e.*, the external resistance belonging to the coil g'.

If, instead of differentiating the expression for a with respect to w' by using the expression I, we had done so with respect to w by using the expression I$'$, we should have obtained in a similar way the following relation between g and g'

$$\frac{(w'-g')(w+g)+f(w+w'+g-g')}{\frac{g}{p}(g'-w')} = \frac{2(g'+w'+f)}{2\sqrt{g}\sqrt{g'}-\frac{g'+w'}{p}}, \quad \ldots\ldots \text{II}'$$

which equation connected with the other

$$\frac{d\phi}{dg'} = -\left\{\frac{\sqrt{g}\frac{dN}{dg'}}{N^2} + \frac{R\sqrt{g}\frac{d\Delta}{dg'}}{N^2}\right\} = -(P'+Q')$$

further we will substitute:

$$\frac{d\Delta}{dg} = \alpha$$

$$\frac{d\Delta}{dg'} = \beta$$

Thus we have the following differential equation:

$$(P-Q)\,dg - (P'+Q')\,dg' + \lambda\left\{\alpha\, dg + \beta\, dg'\right\} = 0$$

λ being the undetermined factor. From this equation we have:

$$P - Q + \lambda\alpha = 0$$

$$\text{and} \quad -(P'+Q') + \lambda\beta = 0$$

or λ eliminated:

$$-\frac{P-Q}{\alpha} = \frac{P'+Q'}{\beta}$$

but we have always:

$$\frac{Q}{\alpha} = \frac{Q'}{\beta}$$

thus we have as end-equation:

$$-\frac{P}{\alpha} = \frac{P'}{\beta}$$

or the value for P, P$'$, α and β substituted we have:

$$\frac{N - 2g\frac{dN}{dg}}{pg'(g-w)} = \frac{2\frac{dN}{dg'}}{2\sqrt{g}\sqrt{g'}-p(g+w)}$$

further substituting

$$\frac{dN}{dg} = g'+w'+f$$

$$\frac{dN}{dg'} = g+w+f$$

and reducing as much as possible, we have

$$\frac{(w-g)(w'+g')+f(w+w'+g'-g)}{p(g-w)g'} = \frac{2(g+w+f)}{2\sqrt{g}\sqrt{g'}-p(g+w)} \quad \ldots\ldots\ldots\ldots\ldots\ldots \text{II}$$

which is the equation II as given above.

In quite a similar manner, equation II$'$ can be found, it must only be remembered that it is more simple to use expression I$'$ for the purpose than I.

$$\frac{g'+w'}{p}\frac{\sqrt{g}}{\sqrt{g'}} - (g+w) = \Delta' = 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad 1$$

gives all that is necessary to determine g and g', being those values which would make the reading at or near balance most sensitive when a variation in w, the external resistance belonging to coil g, takes place.

Now it is clear that equations II and II′ are not necessarily identical, as long as p does not fulfil certain conditions, and therefore the first set of equation II and I may give entirely different values for g and g' from those obtained from the second set II′ and I), which means that a simultaneous maximum sensitiveness with respect to an alteration of the external resistances w, w' in either of the two differential branches, is *not* always possible. The following very important and interesting question, therefore, remains to be solved.

What general condition must be fulfilled in the construction of any differential galvanometer in order to make a simultaneous maximum sensitiveness possible, with respect to an alteration of external resistance in either of the differential branches?

[*To be continued.*]

Notes on a collection of birds from Sikkim,

by W. T. Blanford, F. G. S.—C. M. Z. S.

(With Plates VII and VIII.)

[Received and read 6th September, 1871.]

Mr. L. Mandelli of Darjiling has sent to me for determination a most interesting collection of Sikkim birds, together with a few obtained from the plains near the base of the Himalayas. The birds sent are from various elevations, some being evidently from considerable altitudes. Strange as it may appear, after this chosen land of the feathered tribes had been explored and ransacked for years by such ornithologists as Hodgson, Jerdon, Tickell and many others, it yet yields novelties to so energetic a collector as Mr. Mandelli. Amongst the birds sent is a sixth Himalayan species of *Propasser*, indicated, it is true, some years since by Mr. Blyth, but not hitherto described, and the male of which was previously unknown. There is also a new *Pellorneum*, and apparently one or two undescribed warblers. Two other birds are additions to the fauna of India, and new localities are furnished for a few others.

To my notes on Mr. Mandelli's collection I have added some on birds collected by myself at low elevations in Sikkim. In another paper (antea p. 30), I have given a complete list of all the birds observed or collected by me in the

alpine and subalpine parts of the country, but as the fauna of the Sikkim pine forests differs entirely from that of the warm valleys, I have restricted the notes in my other paper to the former.

[The numbers prefixed to the birds refer to those in Jerdon's Birds of India.]

56*a*. MILVUS MELANOTIS, Temm. and Schl.

Fauna Japonica, Aves, Pl. iv and v.

Milvus major, Hume. Rough notes, Pt. I, p. 326.

After comparing a good series of specimens from the Godávari valley with Temminck and Schlegel's figures and description in the *Fauna Japonica*, I have come to the conclusion that Mr. Hume's first idea, J. A. S. B., 1870, p. 114, was correct, and that the large Indian kite is identical with the Japanese. Mr. Hume has evidently been misled by Radde and Schrenk, who identify *M. melanotis* with *M. migrans*, and he especially mentions (p. 325) that he has not access to the original description or measurements. Of course a bird only as large as *M. migrans* would be much smaller than *M. major*.

In the Fauna Japonica, however, it is expressly stated that *M. melanotis* is as large as *M. regalis*, but distinguished by the tail being less deeply forked, not more than in *M. ætolius* (*i. e. migrans*). The measurements given are; length 23 to 24 French inches, wing 17¼ to 18, tail 10½ to 11, tarsus $2\frac{4}{12}$, mid toe 1½. The sexes are said to differ in size. The above are the dimensions of males of *M. major*, (the corresponding English measures being, wing 19¼, tail 11¾, tarsus 2½,) and the adult female is considerably larger. There is, therefore, an element of doubt in the identification, because one of the birds described by Temminck and Schlegel is said to be an adult female. But as it is admitted by everybody that there is no distinction in the plumage, and as the male of *Milvus melanotis* clearly equals the male of *M. major* in size, it appears to me more probable that there has been a mistake as to the sex marked on one of the dried skins examined by the European naturalists, than that two representatives of *M. regalis* should be found in Eastern Asia.

This magnificent kite appears to be more widely spread in India than was supposed at first, and it is remarkable it should have been so long overlooked. I obtained two specimens in Sikkim, one shot by Captain Elwes's shikari at Tamlúng, the other a young bird in the plumage described at p. 327 of Mr. Hume's "Rough Notes" as that of a young female. The wing measures 19·5 in., so the bird was probably a male.

I have also in February and April of the present year 1871 shot *Milvus melanotis* on the Godávari near Bhadráchalam, about one hundred miles north of Yelaur (Ellore). I obtained three specimens, one of them as late

as April, and I suspect the bird to be a permanent resident in the plains, and probably spread over the northern and eastern part of India. Like other Chinese birds, it may be wanting in Western India.

My observations on the habits of *M. melanotis* differ from those of Mr. Hume so far, that although at times it is certainly wary and difficult of approach, in other cases I have met with it close to human habitations. I shot one flying over my tent, and another a few paces away, near a village in each case, and a third, a fine adult female, I shot sitting on a tree in the middle of a village. I expect *Milvus govinda*, if it found itself limited, would prove equally wary.

71. Huhua Nipalensis, Hodgs.

I obtained a single specimen of this fine owl in the Tísta valley, Sikkim, a little below Chúngtám at an elevation of about 4000 feet. It was sitting on a high tree, in lofty, rather open forest, and calling at about 3 o'clock in the afternoon.* The cry is a single deep hoot. Unfortunately the body was thrown away without my determining the sex. I took measurements before skinning, and the following is a brief description of the plumage which differs somewhat from that noted by Dr. Jerdon.

Above dark hair brown, all the feathers, except those of the head, having the margins mottled with pale fulvous, the amount increasing on the lower back, until some of the feathers are mottled throughout. Upper tail coverts with several rather broad fulvous bars. Scapularies with broad irregular mottled bands and tips, and some of the largest with nearly the whole outer web pale isabelline fulvous, forming a distinct bar. Ear tufts 3¼ inches long, blackish brown on the greater portion of the outer webs, mottled with white on the inner and base of the outer, the white prevailing towards the base on the longest feathers. Lores with long bristly plumes, which are dirty white near the base, and tipped brown; ear coverts greyish white, the upper ones tipped brown; quills earthy brown, the primaries faintly banded, secondaries with broad mottled bars on the outer webs becoming white on the inner. Outer tail feathers similar to the secondaries, central with about six mottled bars; all the rectrices tipped pale brown, whitish at the extreme end. Chin with greyish bristly feathers like the lores, all the rest of the under parts, under wing coverts, tibial and tarsal feathers white with huge brown spots. Toes feathered nearly to the base of the claws. Iris brown, bill and toes yellow, claws dusky at points, pale at base. Length (of fresh specimen) 21½, expanse 58, wing 17·5, tail 9·25, tarsus 3,† bill from gape 2·1, from end

* Mr. Hodgson, in his original description of this bird, As. Res. XIX, p. 172, mentions its diurnal habits.

† This I find in my note book, but I make the dried tarsus about 2¼ to 2½, it is very difficult to measure on account of the thick feathers. Jerdon gives 2 in., which is certainly too little, but his measurements are those of *H. pectoralis*.

of cere 1·43, mid claw straight to point 1·2, inner claw 1·6, hind claw 1·3 inch.

This bird differs from Jerdon's original description of *H. pectoralis*, Madras Journal, Lit. and Sc., Vol. x, p. 89 in the following characters :

The aigrettes are not barred, the feathers of the throat are not barred but spotted ; there is no distinct pectoral band, a slight fulvous tinge on the sides of the breast is all that appears. The bill is yellow, not greenish horny, the toes bright yellow, not reddish yellow. The tarsus appears to be decidedly longer. I should say, judging from the description and Jerdon's figure, that the two forms are distinct species, (conf. Blyth, Ibis, 1866, p. 254).

The Bútia name of this owl is *Migdori.*

80. GLAUCIDIUM BRODIEI, (Burton).

The differences in plumage in this bird are remarkable. I have three specimens lying before me, one being from Mr. Mandelli's collection. In the first, probably a young bird the whole plumage has a rufous tint. The head feathers with broad bars of reddish buff, the tail with 8 bars, each $\frac{1}{10}$ in. broad, extending right across the feather. In the second, the whole prevailing colour is very dark brown, the head with small buff spots, the tail (newly moulted and not fully grown) with narrow bars not extending across the central part of the feather. The third specimen is more rufous than the second, but less than the first, the tail feathers are crossed by 7 bars, interrupted near the shafts, whilst the head is greyish brown, unspotted behind and with only a few faint spots on the forehead. This evidently leads to the form described by Mr. Hume in the Ibis, 1871, p. 26, and referred to under the name of *G. immaculatus* in his Rough Notes, Part I, p. 420.

156. PICUS CATHPHARIUS, Hodg.

In two males, sent by Mr. Mandelli, the bars on the outer rectrices are fulvous, not white. The wings measure 3·75 and 3·9 in.

157. P. MACEI, Vieil.

Specimens from Sikkim differ from those shot near Calcutta in having a somewhat dingy grey tinge with faint subobsolete streaks below, instead of buff. I doubt if the distinction be worthy of specific rank, but so far as I can judge it seems to be constant.* I have two specimens, including one sent

* Since writing the above I have received from Mr. Mandelli a very peculiar specimen of a woodpecker, which I can only suppose to be an old bird of *P. Macei* in a state of semi-albinism. The back is brown, instead of black, and the middle rectrices have one distinct white spot on each web, and a second a little fainter about a quarter inch further back. Otherwise it agrees with *P. Macei*. The dimensions exceed those given by Jerdon, the wing being 4¼ inch long, but I find Bengal specimens equally large.

by Mr. Mandelli, and I find a third in the Indian Museum collection, which contains an abundance of Calcutta specimens. If the Himalayan race be seperable, it might bear Hodgson's name *pyrriceps*. The figures in the *Planches Coloriés* and in Malherbe's Monograph are of the Bengal race.

163. Yungipicus pygmæus (Vigors). Sikkim.

94. Chelidon Nipalensis, (Hodg.)

I found this bird tolerably common in the Tístá valley between Chungtam and Tamlúng, often hunting in company with *Collocalia nidifica*. None were seen above about 5000 feet elevation.

263. Tephrodornis pelvica, (Hodgs.)

An adult (male ?) is sent by Mr. Mandelli, and I have two skins purchased at Darjiling, one perhaps that of a female, agreeing with Swinhoe's description of that sex from a Hainan specimen, Ibis, 1870, p. 242, except that the eye streak is well marked, and the lower points brownish. It is probably a young bird, for there are some pale markings on the edges of the secondary quills. The bill, however, is black throughout. The dimensions (in inches) rather exceed those given by Jerdon and Swinhoe.

	wing.	tail.	tarsus.	bill from forehead.	bill from gape.
1. Adult (? male),...	4·65	3·7	0·82	0·85	1·15
2. ? Female, ...	4·6	3·35	0·83	0·8	1·1
3. Young, ...	4·7	3·6	0·83	0·77	1·1

The third has the plumage above rather light brown, with traces of white bars on the back, the feathers of the head with pale centres, eye streak brown, secondary quills and tail feathers with rufous borders, and an interrupted dark streak, inside the pale border, the tips being mottled; lower parts brownish, but paler than in No. 2; bill pale coloured throughout.

270. Graucalus Macei, Less.

A young bird from Sikkim is moulting, and exchanging its nestling plumage for that of the adult. Some of the nestling feathers remain, those on the back are earthy brown with pale edges, those on the lower parts brownish grey, also with pale edges, but there are not many left, so that it is difficult to say to what extent the under surface is barred in this stage. It is evident, however, that the bars, if they exist, are much broader than in the form commonly described as the young,* and much browner in colour. The new feathers on the other hand are pure ashy grey on the throat and upper breast, barred on the lower breast, abdomen and thigh coverts, the vent being white. Wing 7·2, tail 5·6, tarsus 1·12 inch.

This is a very interesting specimen, because it proves that it is not the young bird, nor the bird of the second year, which is barred underneath

* Hartlaub Jour. F. Ornith, 1864, p. 440.

throughout. I know that in the race inhabiting the Central Provinces the female is barred beneath at all ages. I have four specimens from Chándá and the Godávarí valley, all females, and there are three more in the Indian Museum from Singbhúm, Chutia Nágpúr, &c. Several are evidently adults, all are barred beneath on the throat and breast. Indeed, I am far from sure that the male of the Central Indian form is not also barred, one specimen in the Indian Museum marked as a male from Chutia Nágpúr certainly is so, but a male from Mánbhúm resembles the Himalayan bird, except that it is a little smaller, wing 6·75. This, however, may belong to the Eastern Bengal race, which is found in the Himalayas and East of the Bay of Bengal. The Indian form proper is, as a rule, rather smaller with a slightly smaller bill.*

G. Layardi, Blyth (?*G. pusillus* olim) Ibis, 1866, p. 368, is apparently quite distinct, for it is said to have the anterior under wing coverts barred, which is never the case in adults of the Central Indian form, and, according to Mr. Blyth, the breast in the female of *G. Layardi* is not barred. A description of the adult female of *G. Macei* from Chanda may be useful to enable ornithologists with better collections to determine how far the Indian form is separable from the Himalayan, Eastern Bengal and Barmese race.

Upper parts bluish grey, the feathers of the rump and upper tail coverts with whitish edges. Central tail feathers a rather browner grey, outer tail feathers brown, passing into white at the tips, the white tips, being very narrow and soon worn off on the central feathers, so that they can only be detected in freshly moulted plumage, but increasing progressively in length until in the outermost restrices they are ¾ in. to an inch long. Quills brown, all but the 1st narrowly edged inside and outside with white, the last secondaries (tertiaries) with the outer web grey. Lores dusky grey, a dark band from them passing through the eye and comprising the ear coverts. Lower plumage greyish white barred with darker grey on the throat and breast; abdomen and under tail coverts white, with a few dusky bars, further apart than on the breast, on the upper part of the belly and on the flanks. Measurements (in inches) taken before skinning

Length	wing	tail	tarsus	bill from forehead	bill from gape
12	6·5 to 6·75	5·25	1·	0·9	1·4

Young birds have the grey of the head less pure, and the lower parts white, barred with dusky, the bars in some cases extending to the vent.

If the races from Central India and the Himalayas be distinguishable, it remains to be seen which is *G. Macei* of Lesson. The Himalayan and Barmese races are identical, I believe.

631*a*. ZOSTEROPS SIMPLEX, Swinhoe.

Two specimens from Eastern Nipal, sent to me by Mr. Mandelli, belong to this race, which must be added to the Birds of India. The difference

* This has been, I find, noticed by Beavan, Ibis, 1867, p. 322.

from *Z. palpebrosus* is very slight, being precisely, as mentioned by Mr. Swinhoe, Ibis, 1870, p. 348, the smaller size of *Z. simplex*, and the greener tinge of the upper parts. I find other specimens from the Western Himalayas in the Indian Museum also referable to the Chinese race, whilst, as so frequently happens, specimens from the base of the Himalayas are intermediate in colour. But as there is no distinction either in hue or size between birds from China and others from the Himalayas, and as those from the plains of India appear equally constant, I think these two races are fairly distinguishable, and that the intermediate forms are hybrids. I append the dimensions (in inches) of the Himalayan birds and of two specimens of *Z. palpebrosus.*

	wing	tail	tarsus	bill from forehead.
Z. simplex, Sikkim,	1·95	1·33	0·6	0·37
Do. Do.	1·95	1·45	0·62	0·35
Z. palpebrosus, Godâvari ♂	2·1	1·5	0·6	0·35
Do. Do.	2·15	1·65	0·62	0·35

The Nilgiri race is a little larger than *Z. palpebrosus*, and of the same colour as *Z. simplex*, but the difference is not great, and I have but one specimen for comparison, (Confr. J. A. S. B. 1869, Pt. II, p. 170).

308. Cyornis magnirostris, Blyth.

A female of this rare bird is amongst Mr. Mandelli's specimens, and I find a male in the Indian Museum collection, also from Darjiling. The latter agrees well with Major Godwin-Austen's description, J. A. S. B. 1870, p. 100. The central tail feathers are the same colour as the black. Mr. Blyth Ibis, 1866, p. 371, compares the coloration with that of *Cyornis rubeculoides*, but *C. magnirostris* has not the blue throat of that species, on the other hand the coloration approaches so closely to that of *C. Jerdoni*, that the two species can only be distinguished by the rather darker blue of the back, and the larger size and powerful bill of *C. magnirostris.*

The female has, I think, been described by Jerdon from the rather faded type specimen in the Asiatic Society's collection, the following is an account of the coloration in a fresh specimen. Upper parts olive, forehead and lores rufescent, feathers around eye pale ferruginous, tail browner than back, with a ferruginous tinge on the margins of the feathers; quills dark brown, all but the first two broadly margined with dull rufous. Major Godwin-Austen has overlooked Mr. Blyth's description of the male of this species from Hodgson's drawings, Ibis, 1866, p. 371.

Under parts ferruginous, deepest on the breast, flanks olive, lower abdomen and under tail coverts white.

The dimensions are, in inches.

	wing	tail	tarsus	bill from forehead	bill from gape.
Male..................	3·25	2·45	0·7	0·55	0·77
Female, ...	3·17	2·2	0·7	0·55	0·75

325. ? Erythrosterna acornaus, Hodgs.
(Conf. J. A. S. B. 1869, Pt. II, p. 174).

A specimen from Darjiling which I am disposed to refer to this species has the upper parts olivaceous, whilst on the forehead there is a single blue feather. Can the male bird be blue? I have nothing else to add to the suggestion of Mr. Hume that this form may be the female of *E. maculata* (J. A. S. B. 1870, Pt. II, p. 116).

320. Siphia leucomelanura, (Hodgs.)

Of two specimens sent by Mr. Mandelli, one has the whole chin, throat and upper breast white, and the lower breast and abdomen sordid brown, the other has only the chin and throat white, and the rest of the lower parts, except the lower tail coverts, isabelline. In both the quills are brown, the primaries and all the secondaries, except the last 4 or 5, with rufescent margins. The female has been described by Dr. Stoliczka, J. A. S. B. 1868, Pt. II, p. 32.

321. S. superciliaris, (Blyth).

Of this also two specimens are sent by Mr. Mandelli. The quills are brown with rufous margins, the central rectrices the same colour as the back, lateral rectrices darker, those nearest the centre with narrow faint subobsolete transverse bands, all margined with cyaneous; extreme base of all rectrices, except the centre pair, white. In one specimen the ferruginous colour of the breast is mixed with olivaceous. Wing 2·3, tail 1·75, tarsus 0·7, bill 0·32 inch.

313. Nitidula Hodgsoni, (Moore).

The only specimen differs somewhat, both in colour and dimensions from Dr. Jerdon's description. The quills are dark brown, not black, the secondaries externally with blue edges, the lores and ear coverts appear to be blue, and the colour below is rich ferruginous, as deep as in *Larvivora superciliaris.* Wing 1·9, tail 1·25, tarsus 0·63, bill from forehead 0·35, from gape 0·48 inch.

This bird appears to me rather to consort with the *Ruticillinæ* than with the *Muscicapinæ.* Its bill is slightly more depressed than that of *Ianthia* or *Larvivora*, and its legs a little shorter, but the difference is very small. The fact is, that the distinction between the two families is rather difficult to determine in these Himalayan forms. The bird was described by Moore as a *Nemura* (=*Ianthia*). Mr. G. R. Gray, in his very useful Hand-list of genera and species of birds, evidently by oversight, quotes it twice; as *Nemura Hodgsoni* (3188) at p. 222, and as *Nitidula Hodgsoni* (4903) at p. 327.

329. Pnoepyga squamata, (Gould). *Tesia rufiventer*, Hodgs.

Of two specimens received one has the upper parts nearly uniform olivaceous brown, the other has a small bright ferruginous spot at the apex of nearly every feather. Both have the lower parts ferruginous, the feathers with olive centres and narrow dusky margins. From the differences in the upper plumage, it is evident that the colour of the lower parts does not change with age, (vide antea, p. 55).

338. Brachypteryx cruralis, Blyth.

A pair, male and female, are sent by Mr. Mandelli, and I have a young bird, shot by myself, which I am inclined to refer to this species, although the tarsi are longer than in the adult specimens, whilst the bill is much shorter. It may belong to an undescribed form, so I give a description.

Plumage generally olive brown, all the feathers of the upper parts, throat and breast with rufous centres, upper tail coverts rufous, belly pale brown. Wing 2·55, tail 1·7, tarsus 1·3, bill from forehead 0·43 inch.

336. Brachypteryx nipalensis, Hodgs.

A single specimen from Darjiling has the wings rufous brown, the margins being more rufous than the rest of the feathers. The grey of the breast is mixed with white, and there is a greyish tinge on the feathers of the throat and abdomen in places. This may be a young male. Wing 2·4, tail 1·5, tarsus 1·08, bill from forehead,0·47.

I fully agree with Mr. Hume (Ibis, 1870, p. 529) in considering *Hodgsonius* as closely alied to *Larvivora*, but I cannot see the possibility of dissociating it, and *Callene*, from *Brachypteryx*, as is done by Mr. G. R. Gray, in his recent "Hand-list of Birds," in which he places the last named in the *Leiothrichinæ** (a position unsuited for it in my opinion,) and all the other genera named, with *Ruticilla*, in the *Lusciniinæ*. *Brachypteryx nipalensis* is very much like a *Calliope*, and although there is also a similarity to *Pnoepyga*, it is I think not so marked, partly perhaps because there is no resemblance in the general coloration.

It is a pity we have no details of the nidification of *Brachypteryx*, as it would aid in shewing its affinities. The nest of *Callene frontalis* is said to be wren-like, Ibis, 1866, p. 373, but the allied *C. albiventris*, (P. Z. S. 1867, p. 834), nidificates in a hole of a tree, and lays but two eggs. Unless the length of a bird's tail be taken as the most important point in its structure, I do not see how *Callene* and *Brachypteryx* can be classed apart, and I am

* Prof. Newton, in the Zoological Record places *Brachypteryx* amongst the *Timaliidæ*. Some Malayan forms, formerly assigned to *Brachypteryx* belong to this family, (Ibis, 1865, pp. 33, 47), but the Himalayan species differ greatly in structure and habits from the Timaline birds.

disposed to separate both from the wrens, and also from *Myiophonus*, and class them with *Hodgsonius*, *Ianthia*, *Larvivora*, *Tarsiger*, and *Calliope*, either in the *Ruticillinæ*, or as a distinct subfamily. I am not sure but that *Nitidula* might be added.

529. Horeites major, Hodgs.

I obtained a specimen on Sinchal near Darjiling.

498. Ruticilla Hodgsonii, Moore. Sikkim.

570. Ianthia superciliaris, (Hodgs.)

The female appears rather smaller than the dimensions given by Dr. Jerdon. I find in one from Darjiling, wing 3·05, tail 2·5, tarsus, 1·17, bill from forehead 0·45 inch. The distinctions between this form and *Ianthia rufilata* scarcely appear to warrant generic separation.

507. Larvivora superciliaris, (Jerdon).

The chin in the male is white, with a black streak on each side, thigh coverts mixed with grey. Wing 2·82, tail 1·75, tarsus 1·, bill from forehead 0·45, from gape 0·63 inch.

Placing this species beside a series of flycatchers, including *Cyornis Jerdoni*, *C. magnirostris*, *Siphia superciliaris* and *Nitidula Hodgsoni*, it is curious to remark the extraordinary similarity in the colouring and its distribution, whilst, except the bill, there is really very little structural difference between these various birds. The tarsi vary in length certainly, but all have rather long than short tarsi.

477. Myiomela leucura, Hodgs.

I shot a male of this species at Darjiling; it was running along a road in the evening at dusk. Mr. Mandelli has sent a female. The white on the tail, judging from these specimens, occurs on all the feathers except the central and outer pairs, and it increases inwardly, not outwardly, as stated by Jerdon.

594. Budytes citreolus, (Pall).

A Sikkim specimen has the wing 3⅛ in., and is consequently the larger race, if there be two, or *B. citreolus*, Pall., *verus*.

766. Alauda arvensis.

Amongst the specimens procured by me at Darjiling is a skin of a lark, which, to the best of my recollection, was purchased with some other skins of birds, evidently shot in the neighbourhood, from a shikari. It only differs from English specimens of the skylark by its greyer tint on the back and hind neck. Wing 4·2, tail 2·55, bill 0·45, tarsus 0·98, hind toe and claw 1·08, claw alone 0·65 inch.

The occurrence of *A. arvensis* so far to the eastward strongly confirms Mr. Blyth's view of the identity of *A. triborhyncha*, Hodgs. (Ibis, 1867, p. 47) with it.

560*a*. PHYLLOSCOPUS PALLIDIPES, sp. nov. Pl. vii.

P. supra umbrino-olivaceus, uropygio magis rufescenti; loris et lineâ postoculari umbrinis, superciliis albis, postice elongatis; remigibus umbrinis, extus rufescente olivaceo marginatis, rectricibus mediis cum dorso fere concoloribus, cæteris umbrinis, olivaceo-marginatis; gastro sericeo-albo, pectoris lateribus olivaceis, axillâ albâ; rostro supra fusco, infra pallido; pedibus albescentibus. Long. alæ 2·05, *caudæ* 1·7, *tarsi* 0·76, *rostri a fronte* 0·4, *a rictu* 0·55 *unc.*

Brownish olivaceous above, supercilium white, extending far back, a dark line from the lores through the eye to the upper part of the ear coverts, the lower portion of which are light brown, central rectrices very little darker than the back, outer rectrices and wing feathers earthy brown, margined with olive which is rufescent on the edges of the quills. There is also a rufescent tinge on the rump. Lower parts silky white, sides of the breast dusky olivaceous, and the middle of the breast not quite so fine a white as the throat and abdomen, but this may be an individual peculiarity. Lower wing coverts, axillaries, and forepart of wing white. Bill dark above, pale below; feet very light coloured. The fifth quill is the longest, it exceeds the first by 0·87 in., the second by 0·4, the third by 0·15.

This form of which a single example in beautiful order has been sent by Mr. Mandelli appears to me quite new. It is near *P. neglectus*, Hume, Ibis, 1870, p. 143, but differs in its olivaceous tint above, smaller size and in the very pale coloured tarsi and feet. It is also quite distinct from *P. tristis*, Bl., *P. fuscatus*, Bl., *P. lugubris*, Bl., and from the various species described from China by Mr. Swinhoe, *P. tenellipes*, Swinh., alone resembling it in its pale feet, but differing in colour.

REGULOIDES SP.?

A single specimen from Mr. Mandelli's collection closely resembles *R. proregulus*, Pall. (*R. chloronotus*, Hodgs.) in appearance and size, and has a similar minute bill though a little broader and more *Abrornis*-like, but the head is dusky grey, almost black, with a white central line and white supercilia, a distinct dusky line from the lores through the eyes; cheeks, throat and breast greyish white, lower breast and abdomen pale yellow, the two outer tail feathers on each side have the whole inner web white, and the third has nearly the whole, a very narrow border inside the web near the tip being brown, but the tip of the inner web itself white, not dark as in *R.*

erochroa. The wings and central rectrices are earthy brown with green outer margins, margin of wing yellow, inner wing coverts and inner margins of quills white, a little pale yellow on the axillaries, back olive, rump yellowish white. Bill dark throughout, without the pale base beneath of *R. proregulus.* Wing 1·82, tail 1·2, tarsus 0·7, bill from forehead 0·3, do. from gape 0·38 inch.

This appears to me to be an undescribed species. It is possible that it may be *Abrornis maculipennis,* Blyth, but in that case the measurement of the wing, Ibis 1867, p. 27, given as 2·75 in. must be a misprint for 1·75. This is possible, for the length of the tarsus is misprinted evidently. The bill in the specimen before me is somewhat between that of *Reguloides* and *Abrornis,* but the plumage is that of the former genus.

REGULOIDES SP. ?

This is again a single specimen, and may possibly be a variety of the last. It differs in being larger, but having a still shorter bill, and in the tips of the larger wing coverts being golden yellow, almost orange. There is a yellow tip in the outer web of the last few secondary (tertiary) quills which are in bad condition in the specimen last described, thus adding to the similarity to *Abrornis maculipennis.* The legs appear to differ in colour from those in the specimen last described. Wing 2, tail 1·35, tarsus 0·7, bill from forehead 0·27, from gape 0·35 inch.

570. CULICIPETA CANTATOR, (Tickell).

Mr. Blyth calls this an *Abrornis* (Cat. Birds As. Soc. Mus. p. 183, and Ibis, 1867, p. 26). Two specimens which I can only refer to this bird are amongst Mr. Mandelli's despatch. The bill appears to me intermediate in form between *Abrornis* and *Culicipeta,* whilst the plumage is that of the latter genus, or rather of *Reguloides.* In fact but for the bill, the skins might be considered small specimens of *R. trochiloides.*

As there is no specimen of *C. cantator* in the Indian Museum, it is just possible I may be in error in the present identification. The birds do not agree very closely with Jerdon's description. The following are their characters.

Head greenish dusky above with an irregular whitish central streak, supercilia pale yellow, sides of head mixed dull green and whitish. Back dull green, a little lighter on the rump. Wings and tail brown, edged with green externally, the three outer rectrices on each side having the inner web margined and tipped with white, most broadly on the outer feathers. Tips of wing coverts pale yellow, forming two bars; edge of wing and axillaries pure yellow; under parts greenish or yellowish white. Bill dusky above, pale below; feet rather dark.

	Wing	Tail	Tarsus	Bill from forehead	Bill from gape.
(1)	2·28	1·73	0·73	0·38	0·55 inch.
(2)	2·1	1·6	0·7	0·38	0·54 „

574. ABRORNIS SUPERCILIARIS, Tickell.

J. A. S. B., 1859 p. 414,—*A. flaviventris*, Jerdon, Birds of India, vol. ii, p. 203.

As pointed out by Mr. Blyth, Ibis, 1867, p. 26, Darjiling specimens appear to agree with those from Tenaserim.

577. A. ALBOGULARIS, Hodgs.

Top of head rufous olive, with a black band on each side above the rusty supercilia, wings yellowish white within.

579. TICKELLIA HODGSONI, (Moore).

Mr. Mandelli has obtained three specimens of this rare bird, two of which appear to have no yellow in the middle of the rump, only the sides being of that colour. The fifth and sixth quills in both specimens slightly exceed the fourth in length.

	Wing	Tail	Tarsus	Bill from forehead	Bill from gape.
1	1·95	1·7	0·72	0·4	0·58 inch.
2	1·82	1.61	0·8	0·35	0·53 „
3	1·93	1·75	0·8	0·34	0·5 „

519*a*. DUMETICOLA BRUNNEIPECTUS, Blyth, Ibis, 1867, p. 20.

The following is the description of a specimen sent by Mr. Mandelli.

Upper parts uniform olive brown, quills and outer rectrices brown with margins of the same colour as the back; lores whitish, chin, throat and middle of belly dirty white, sides of neck and breast the same colour as the back, middle of the breast pale brown, thigh coverts, vent and under tail coverts olive brown, the last named with white tips of no great breadth, about 0·1 in.; bill black, feet brown. Wing 2·3 in., tail 2, the central feathers exceeding the outer by 0·3, tarsus 0·82, bill from forehead 0·38, from gape 0·55. The fifth quill is the longest, the fourth very little shorter, third less by 0·1, second by 0·37 and first by 1 inch.

522. TRIBURA LUTEOVENTRIS, Hodgs.

I refer to this species a specimen sent by Mr. Mandelli, but which has not a trace of yellow on the lower parts.* The only example of Hodgson's species in the Indian Museum is in very bad order, and the colours have

* In Hodgson's original description P. Z. S. 1845, p. 30, the bird is said to be above olive brown with a luteous lustre, below lutescent laterally, and albescent centrally, a pale line over the eye. This agrees much better with the specimen before me than does Jerdon's account in the 'Birds of India.'

faded so much that it is difficult to form an idea of what they originally were. I append a description of Mr. Mandelli's bird.

Above uniform rufescent brown with an olivaceous tinge, wings and tail rather darker brown, the former with the margins of the feathers rather more rufous, sides of head and indistinct supercilia paler. Beneath, the chin and throat are dirty white, the remainder of the lower parts a similar colour to the back but paler, albescent towards the vent. Wing 2·1, tail 2·4, much graduated, the outer feathers 1·2 shorter, tarsus 0·73, bill from forehead 0·39, from gape 0·62 inch.

The figure of *Calamodyta affinis* in Gray's Genera of Birds, Pl. xlix, stated by Mr. Blyth, Ibis, 1867, p. 19, to represent this species, is altogether paler and more rufous than the specimen sent to me. It might have been taken from a faded specimen, but I cannot help thinking it possible that two forms are confounded under this species. Can one of them be *Horornis fortipes?*

535. Prinia Stewarti, Blyth.

A specimen sent by Mr. Mandelli is probably from Parniya or Tirhût. It is certainly smaller than specimens of *P. socialis* which I possess from the neighbourhood of Yelaur (Ellore), and the grey of the back is darker and purer, but the bill, though rather shorter, appears decidedly broader at the base. Wing 1·82, tail 2·1, tarsus 0·85, bill from forehead 0·42, from gape 0·55 inch.

537. P. cinereo-capilla, Hodgs.

Head, nape and hind neck, lores and upper ear-coverts rather earthy brown, remainder of upper parts very rufous brown, ochraceous on the rump, most rufous on the wings and tail; quills hair brown, margined with rufous; tail feathers more rufous, with pale tips, and a distinct dark spot just before it. Supercilium and lower parts white, with a faint creamy tinge, sides of breast olivaceous, flanks rufous, thigh coverts ferruginous; wing 1·75, tail 1·78, tarsus, 0·8, bill from forehead 0·4, from gape 0·55 inch.

This differs a little from Jerdon's description; his length of the bill ⅝ in. must be a misprint for ⅜. From *P. gracilis* the much more rufous lower back, wing and tail, and the darker head, serve easily to distinguish the present species, but the under parts with the exception of the thigh coverts are not more rufous. The bill appears to be a little stouter.

391. Stachyris nigriceps, Hodgs.

A specimen wants the white supercilium and has the fore-neck bright rufous, much more rufous than the abdomen. Wing 2·2, tail 1·85, tarsus 0·85, bill 0·65 inch.

399*a*. Pellorneum Mandellii, sp. nov. Pl. VII.

P. peraffine P. ruficepi, Swains., *sed staturâ minori, collo postico et laterali maculis fuscis magnis signato, maculis pectoralibus majoribus et*

saturatioribus. Long. alæ 2·65, *caudæ* 2·5, *tarsi* 0·95, *rostri a fronte* 0·6, *a rictu* 0·75 *unc.*

Crown of head and nape ferruginous, lores, over and under the eye, pale pinkish isabelline, most of the feathers of the forehead, lores and supercilia with slight dusky tips, ear coverts pale rufous brown, also with dark tips, back of the neck isabelline, or pale brown, each feather with a large dusky spot, frequently confined to one web, mantle and tail brownish olive, all the rectrices except the centre ones with narrow pale tips, quills hair brown margined with brownish olive externally, internally, like the lining of the wing, pale brown. Chin and upper throat pure white, remainder of lower parts isabelline, breast and sides of neck with large elongate dusky spots, flanks also spotted, but the spots are paler, abdomen unspotted. Bill dusky above, pale below, legs very pale coloured.

This species differs from *P. ruficeps*, Swains., and *P. Tickelli*, Blyth, (J. A. S. B., 1859, Vol. xxviii, p. 414; = *P. subochraceum*, Swinhoe, A. and M. N. H., April, 1871, p. 257), by having the neck spotted all round and by the spots in front being much deeper and darker. In size it resembles *P. Tickelli*, being smaller than *P. ruficeps*. It may perhaps be the new species from the Khasi hills mentioned by Dr. Jerdon in Birds of India, II, p. 28. A single specimen has been sent to me for identification by Mr. Mandelli, after whom I have named it.

620. Minla cinerea, (Blyth).

The type of this species is a very dull coloured grey specimen. I am almost inclined to doubt, if the much more brightly coloured birds described by Jerdon, and of which a specimen is sent by Mr. Mandelli, are really identical, but a series is necessary for deciding this. In the bird sent to me the wing measures 2·1, tail 1·5, tarsus 0·82 inch.; the dimensions are rather less than those of the type specimen, so that, if the differences are sexual, the female would appear to be the larger bird.

625. Ixulus striatus, Blyth.

Neither Mr. Blyth in his original description of the Tenaserim specimen, nor Dr. Jerdon in the characters taken doubtless from his Darjiling or Khasi birds, mentions one of the most characteristic peculiarities of this form,—its ferruginous brown ear coverts and supercilia. In the type from Tenaserim, which is in the Indian Museum, I can detect these, although they are paler (perhaps from fading) than in a fresh specimen obtained by Mr. Mandelli, which otherwise agrees perfectly with Dr. Jerdon's description. Wing 2·35, tail 2·1, tarsus 0·6, bill from forehead 0·35 inch.

630. Herpornis xantholeuca, Hodgs.

Of two specimens sent, one has a decidedly rufescent tinge on the back. The colour is dull yellowish green above, under wing coverts and inner margins of both remiges and rectrices bright yellow. The coronal feathers have not black shafts and the margin of the wing is yellow, these being distinctions from the new Hainan and Formosan species, *H. tyrannulus*, recently described by Mr. Swinhoe (Ibis, 1870, p. 347, pl. x), besides the duller colour of the plumage.

632. Sylviparus modestus, Burton. Single specimen.

647. Machlolophus xanthogenys, (Vigors).

A specimen was obtained in Eastern Nipal. Its representative form, *M. spilonotus*, occurs around Darjiling.

694. Ploceus baya, Blyth. J. A. S. B., xii, p. 945.

P. megarhynchus, Hume, Ibis, 1869, p. 356, and 1871, p. 36.

Mr. Hume has pointed out that there are two species of *Ploceus* in India of the form originally confounded under *P. philippinus*, L. To one of these, which is larger than the other, and distinguished by a larger bill, he has given the name of *R. megarhynchus.* I find, however, that the large billed form is that inhabiting the Himalayas, Eastern Bengal, Asám, Malacca and probably Barma, and that it was upon specimens of it that Mr. Blyth's *P. baya* was founded, as it is the species found at Calcutta, and all the examples in the Asiatic Society's collection appear to belong to it.

There is of course a possibility that I may be mistaken in this, and that Mr. Hume's *P. megarhynchus* may be, in the breeding plumage, something well distinguished from *P. baya*, but I can detect no difference of the least importance in the description of the birds in non-breeding plumage. At the same time it is clear that there are two varieties of *P. baya*, but I am not quite sure that the difference is sufficiently constant to deserve specific distinction. I append measurements (in inches) of the two forms.

	wing	tail	tarsus	bill from front
P. baya, six specimens: four males, two females from Calcutta, Sikkim and Cachar.	2·85 to 3·05	1·87 to 2·15	0·82 to 0·9	0·69 to 0·77
P. baya, small var., three specimens: one male and two females from Singhbúm and Chanda.	2·6 to 2·75	1·7 to 1·8	0·79 to 0·9	0·65 to 0·69

I can detect no constant difference between males and females. Bonaparte's remark in the Conspect. Gen. Av. p. 442 *fœmina minor*, must have

been due to his having seen females, or males, in non-breeding plumage of the smaller form.

The smaller form is of course the *P. baya* of Jerdon's Birds of India.

723. Euspiza rutila, (Pall.)

Fauna Japonica, Aves, p. 95, pl. lvi, B.

This is an addition to the Indian fauna. The specimen sent by Mr. Mandelli agrees perfectly with Mr. Blyth's description of that shot by myself near Bassein in Pegu, (J. A. S. B., 1863, p. 77), and with the description and figure in the Fauna Japonica. I add characters taken from the Sikkim specimen which is doubtless a male.

Head and neck, upper breast, back, wing coverts, and broad edges to the last secondary quills (tertiaries of some authors) uniform reddish ferruginous, with slight hoary edges to some of the feathers (doubtless disappearing in spring), especially on the chin, lores, and round the eyes; wing and tail brown, the quills narrowly edged with yellowish white, second, third and fourth quills emarginate on the outer webs, margin of wing yellow, inner wing coverts and inner margins of quills white, lower parts from breast yellow, not very bright, flanks olive.

Wing 3 in., tail 2·4, tarsus 0·77, bill from forehead 0·43.

I learn from Mr. Mandelli that this bird was shot in British Sikkim on the great Rangit river in March, and that he has a second specimen from Dalingkót in Bútán, shot in April.

745*a*. Propasser saturatus, sp. nov. Pl. viii.

♀ *P. thura*, Blyth, Museum Asiat. Soc., *nec* Bonaparte, *vide* Ibis, 1865, p. 44, et 1867, p 44

♂ juv.? *P. thura*, ♀, (nec ♂) Moore P. Z. S. 1855, p. 216, Pl. cxiv.

P. mas fronte, superciliis latis et genis pallide argentato-roseis, capite insuper nuchâ et lateribus colli cum regione auriculari saturate coccineis, vertice nigro striatulo; dorso brunneo, plumarum marginibus pallidis, coccineo lavatis, uropygio vix lætiori; remigibus cum tectricibus alarum rectricibusque umbrinis, rubro-marginatis, tectricibus et 3 *ultimis pennis ad extremitates externas roseis, flexurâ alæ tectricibusque subalaribus partim roseo-marginatis; mento grisescente, gula læte coccineâ, nitore argenteo splendente, pectore saturatiori, plumis pallide marginatis, abdomine pallide roseo, unâ cum pectore subobsolete fusco striatulo, subcaudalibus brunneis, roseo-marginatis, tibiis et hypochondriis rufo-brunneis. Long. alæ* 3·22, *caudæ* 2·6, *tarsi* 0·95, *rostri a fronte* 0·49, *a rictu* 0·52, *l. tota circa* 6 *unc. angl.*

Fœmina umbrina, capitis et dorsi plumis pallide marginatis, superciliis latis isabellinis; alis caudaque umbrinis, pennis extus pallide marginatis,

maculis ad extremitates externas tectricum et 3 pennarum ultimarum albescentibus, uropygio ochraceo-tincto, gastro fulvo, fusco striato, abdomine pallidiore et magis rufescente. Long alæ 3·15, *caudæ* 2·5, *tarsi* 0·95, *rostri a fronte* 0·47, *a rictu* 0.5 *unc.*

Male with a general brownish tint above, richly glossed with crimson, lores, forehead, supercilia and cheeks pale silvery pink, the bases of the feathers brown, head above dark crimson with blackish centres to the feathers, ear coverts and sides of the neck duller crimson, the centres of the feathers broader and less distinct, back with broad dashes of dark earthy brown, the edges of the feathers pale with a gloss of deep rose colour, approaching crimson, rump and upper tail coverts nearly the same colour as the back, the dark centres of the feathers being less marked, and the paler margins with their crimson gloss broader. Wing and tail feathers earthy brown with red brown exterior margins, and pale rosy spots on the tips of the outer webs of the wing coverts and of the last three quills. Chin greyish, throat full rose colour, darker than the cheeks, with a silvery gloss. The breast is deeper and darker red, the feathers having pale rosy edges and narrow dark central stripes, abdomen pink, also with narrow streaks; under tail coverts brown, edged with pink; thighs and flanks brown, slightly tinged here and there with pink. Bill dusky, legs brown.

The female is earthy brown, the feathers of the upper parts with pale margins, and the wing coverts and last three quills (tertiaries) with albescent tips to the outer webs, supercilia isabelline, rump with an ochraceous tinge. Under parts fulvous, all the feathers with dark centres, broader on the breast, narrower on the abdomen, which has a rufescent tinge.

Another bird, apparently a young male is much more ochraceous than the female in colouring, especially on the under parts, sides of neck and head; the margins of the quills and tail feathers are olivaceous.*

This beautiful rose finch is evidently the species of which a female exists in the Asiatic Society's Museum, labelled *P. thura* by Mr. Blyth, and to which that gentleman refers in the "Ibis". in the two instances cited above. It is altogether of a richer and darker colour than any of the other Himalayan species with which I am acquainted, *viz., P. rhodopeplus, thura, rhodochlamys* and *rhodochrous*, and easily distinguished from all at once by the absence of the rosy rump. *P. pulcherrimus* is said to be near *rhodochrous*, which differs perhaps more from the present species than any of the others, it too

* Another pair of this bird since received from Mr. Mandelli confirms the above description, except that the throat of the male is the same colour as the cheeks, instead of being rather deeper red; they measure (in inches)—

	wing	tail	tarsus	bill from forehead.
Male,........	3·15	2·5	0·92	0·48
Female, ...	3·05	2·45	0·95	0·49

has a crimson rump. On the whole the present form approaches ***rhodopeplus*** more than any of the other species, but besides the differences already noted the forehead in *rhodopeplus* is not brighter in colour than the crown of the head.

The bird figured as the female of *P. thura* by Mr. Moore in the Proceedings of the Zool. Soc. of London for 1855, Aves, Pl. cxiv, does not belong to that species. It may perhaps be the young male of this bird but its general coloration appears too rufous. The colour differs greatly from that of the female of *P. saturatus.*

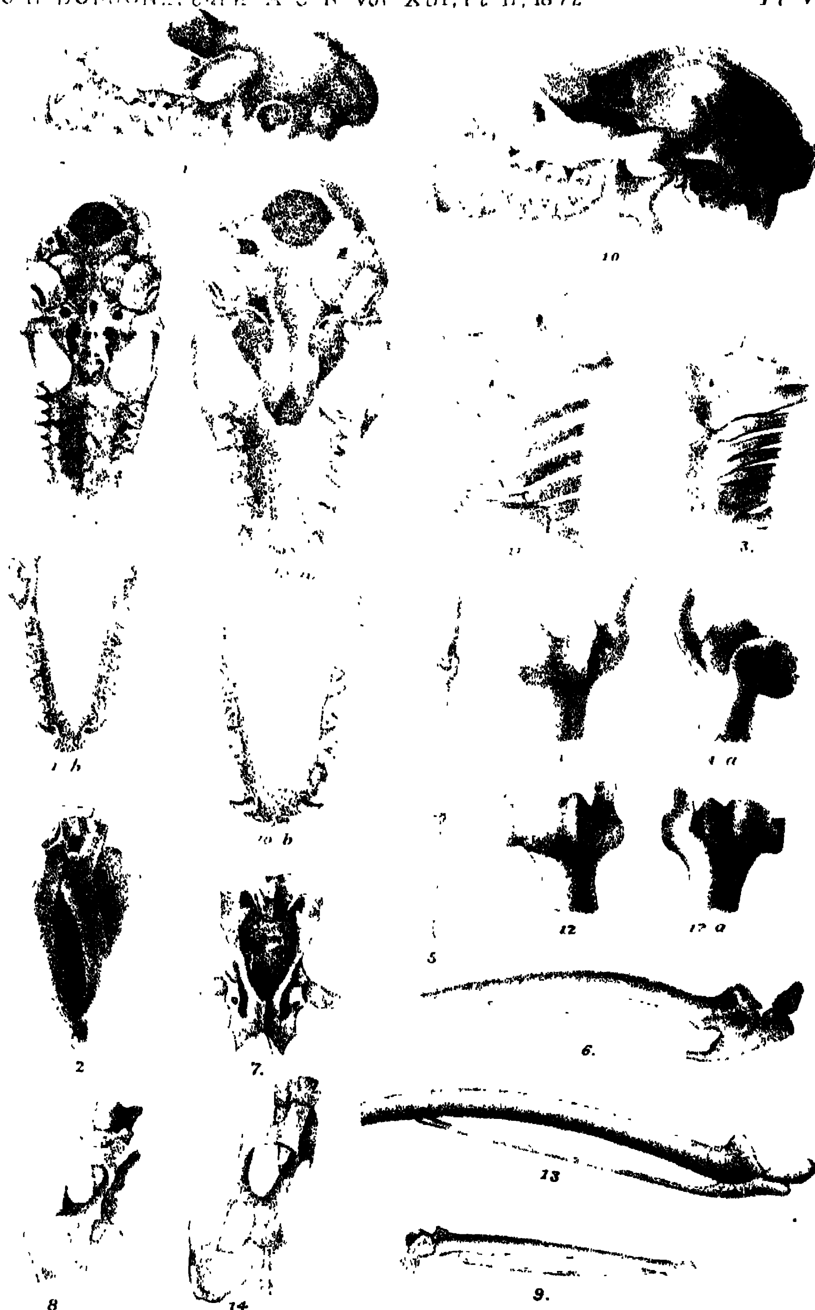
At this time it is surprising to find that so beautiful a bird as this has hitherto been overlooked in the Sikkim Himalayas. Mr. Mandelli informs me that the specimens were shot on Tonglú, about 10,000 feet high near Darjiling.

Amongst other interesting birds sent by Mr. Mandelli are *Xiphoramphus superciliaris, Suya criniger, Neornis flavolivacea, Pteruthius erythropterus, Accentor strophiatus, Emberiza pusilla* and *Chrysomitris spinoides.*



1 *Hinulia indica*, Gray
2 " *maculata*, Blyth
3 " *Dussumieri*, D& B
4. *Mocoa sacra*, n. sp
5. *Ristella Travancorica*, Bedd.

1 *Euprepes macularius, Bl.*
2. *Mocoa Sikkimensis, Bl.*
3. *Riopa cyanella, n. sp.*
4 *Riopa anguina, Theob.*
5 " *Hardwickii Gray*
6 " *albopunctata,*



Osteology of Triænops persicus
(For explanation see p. 141)

JOURNAL

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Part II.—PHYSICAL SCIENCE.

No. III.—1872.

MONOGRAPH OF INDIAN CYPRINIDÆ, PART V,—*by Surgeon Major* F. DAY.

[Received 7th March, 1872, read 1st May, 1872.]

3. *Sub-family*—COBITIDINA.

[Continued from p. 29.]

Pseudobranchiæ absent. Body elongated, oblong, compressed or cylindrical, but never depressed. Snout and lips fleshy. Mouth small, inferior, and furnished with from six to twelve barbels. Pharyngeal teeth few and in one row. Vertical fins spineless. Dorsal fin with a varying number of rays (8-30), *anal with few* (7-8), *ventrals absent in one genus. Scales, small and cycloid, when present, and usually immersed in mucus. Lateral line single. Air vessel entirely, or partially, enclosed in a bony capsule.*

Geographical distribution. Loaches are found in tanks and rivers throughout the hills and plains of India and Barma, but apparently are absent from the Andaman islands. All the recognised genera seem to be represented in the East. These fish are mostly captured by lading out tanks commencing to dry up, but as they dive about in the mud, they are usually difficult to capture.

Uses.—They are all good as food.

SYNOPSIS OF GENERA.

A. *With an erectile spine near the orbit.*

1. ***Apua,*** **eight barbels, two rostral, four maxillary and two mandibular. Spine suborbital. Dorsal fin short (8 rays) in the posterior third of the body, but anterior to the anal. No ventrals.** ***Barma.***

2. ***Acanthophthalmus,*** **six barbels, two rostral, four maxillary. Spine suborbital. Dorsal and anal fins as in** ***Apua.*** **Ventrals present.** ***N. E. India, Assam, Barma.***

3. *Lepidocephalus*, six barbels, four rostral, two maxillary. Spine suborbital Dorsal fin short, in last two fifths of the body. *Malay Archipelago.*

4. *Acanthopsis*, eight barbels, two being mandibular Spine before the orbit. Dorsal fin of moderate length (12 rays), placed opposite the ventrals *Barma.*

5. *Cobitis*, six barbels, all rostral and maxillary. Spine suborbital. Dorsal fin short (9-10 rays), placed opposite the ventrals. *India* and *Barma.*

6. *Lepidocephalichthys*, eight barbels, two mandibular. Spine suborbital. Dorsal fin short (8-9 rays), placed opposite the ventrals. *India.*

7. *Botia*, six to eight barbels, if six, all are rostral and maxillary, should there be eight, the extra pair are mandibular Spine suborbital. Dorsal fin of moderate length (10 to 15 rays), commencing anterior to the ventrals. *Northern* and *Eastern India* and *Barma.*

8. *Jerdonia*, eight barbels, two being mandibular. Spine suborbital Dorsal fin long (30 rays), commencing anterior to the ventrals.

B. *Destitute of spine near the orbit.*

9. *Nemacheilus*, six to eight barbels, rostral and maxillary; if eight, the extra pair at the posterior nostril. Dorsal short or of moderate length (8 to 17 rays) commencing opposite the ventrals. *India* and *Barma.*

10. *Oreonectes*, six barbels, rostral and maxillary. Dorsal fin short (9 rays), far behind the ventrals. *China.*

11. *Misgurnus*, ten to twelve barbels, four being mandibular. Dorsal short (9 to 10 rays), commencoing opposite the ventrals. *Barma.*

A. *With an erectile spine near the orbit.*

Genus. Apua, *Blyth.*

Body elongated and compressed. A small, erectile, bifid, suborbital spine. Eight barbels, one rostral pair, one maxillary pair, and two mandibular pairs. Dorsal fin in the posterior third of the body, but anterior to the anal. Ventral fins absent.

Geographical distribution.—The single species of this genus, which has yet been discovered, was obtained near Pegu in British Barma.

A SINGLE SPECIES.

1. *Apua fusca*, D 2/6. A. 2/6. *Barma.*

1. Apua fusca.

Blyth, Journal Asiatic Society of Bengal, 1860, p. 169; *Günther, Catal, vii, p. 371; Day, Proc. Zool. Soc. 1869, p. 349.

B. III. D.2/6. P. 11. A. 2/6. C. 16.

Length of head 1/8, of caudal 1/9, height of body 1/8 of the total length. *Eyes*, small, diameter 1/9 of length of head, 4 diameters from end of snout. A small erectile bifid spine below the orbit. *Fins.*—Dorsal half as high as the body; caudal rounded. *Colours*, brownish, with a longitudinal darker band. There are three specimens in the Calcutta Museum, the largest being $2\frac{1}{8}$ inches long.

Hab.—Barma.

Genus. 2. ACANTHOPHTHALMUS, *v. Hass.*

Pangio, Blyth.

Body elongated and compressed. A small, erectile, bifid, suborbital spine. Six barbels, one rostral and two maxillary pairs. Dorsal fin situated in the posterior third of the body, anterior to the anal, but posterior to the ventrals.

Geographical distribution.—North-east Bengal, Assam and Barma.

A SINGLE SPECIES.

1. *Acanthophthalmus pangia.* D. 2/6. A. 2/5, Cinnamon colour. *N. E. Bengal to Upper Barma.*

1. ACANTHOPHTHALMUS PANGIA.

Cobitis pangia, Ham. Buch., Fish. Ganges, pp. 355, 394; *Cuv. and Val xviii, p. 75.

Cobitis cinnamomea, McClell., Ind. Cyp., pp. 304, 435, pl. 51, f. 5. (from H. B. MSS.).

Pangio cinnamomea, Blyth, J. A. S. of B. 1860, p. 169.

Acanthophthalmus Javanicus, Bleeker, Cyp. Pro., p. 75, and *Atl. Ich. Cypr.* p. 11, t. 2, f. 3.

Acanthophthalmus pangia, Günther, vii, p. 370.

Pangya, Beng. *Nga-tha-lay-doh*, Barmese.

B. III. D. 2/6. P. 10. V. 6-7. A. 2/5. C. 17.

Length of head 1/8, of caudal 1/8, height of body 1/8 of the total length. *Eyes*, minute. *Scales*, distinct. *Colour*, light cinnamon.

Hab.—North-East Bengal, the northern portions of British and Upper Barma. I obtained many specimens at Mandalay, from the canal then in the course of construction. I have also received one from below Darjiling, collected by Mr. Mandelli; the specimen agrees with the others, except in having no scales, but as it is not in a good state, I conclude they may have been rubbed off.

Genus. 3. LEPIDOCEPHALUS, *Bleeker.*

Body elongated and compressed. An erectile, bifid, suborbital spine. Six barbels, four rostral, two maxillary. Dorsal fin placed in the posterior two fifths of the body, some distance behind the root of the ventrals. Caudal truncate.

Geographical distribution.—The species of this genus are found in Java and Sumatra.

Genus. 4. ACANTHOPSIS, *v. Hass.*

Prostheacanthus, Blyth.

Body very elongated, snout long and compressed. Barbels eight, two being mandibular. A small, bifid, erectile spine, situated in advance of the orbit. Dorsal fin opposite to the ventrals; caudal forked.

Geographical distribution.—Tenasserim and Barma.

A SINGLE SPECIES.

1. *Acanthopsis choirorrhynchus.* D. 3/9. A. 3/5. *Barma, &c.*

1. ACANTHOPSIS CHOIRORRHYNCHUS.

Cobitis choirorrhynchus, Bleeker, Nat. Tyds. Ned. Ind vii, p. 95.

Prostheacanthus spectabilis, Blyth, J. A. S. of B. 1860, p. 167.

Acanthopsis choirorrhynchus, Bleeker, Atl. Ich. Cyp. p. 9, t. i. f. 3; Günther, Catal. vii, p. 365; Day, Proc. Zool. Soc. 1869, p. 549.

Nga-tha-lay-doh, Barmese.

B. III D. 3/9. P. 11. V. 7. A. 3/5. C. 11.

Length of head 2/9, of caudal 1/5, height of body 1/9 of the total length. *Eyes* situated in the posterior 2/5 of the head. *Fins;* dorsal arises midway between end of snout and base of caudal, which latter is forked. *Colours*—brownish, with twelve bands across the back, and an equal number of blotches along the lateral line. Two rows of spots along the dorsal, aud three along the anal fins.

Hab. Barma and Sumatra.

Genus. 5. COBITIS, *Artedi.*

Somileptes, Bleeker.

Body elongated and compressed, dorsal profile nearly horizontal. Six barbels on the snout and upper jaw. A small erectile, bifid, suborbital spine. Dorsal fin inserted opposite to the ventral; caudal truncated or rounded.

Geographical distribution.—The Indian species of this genus extend from Orissa through Bengal to Barma.

SYNOPSIS OF SPECIES.

1. *Cobitis gongota*, D. 10. A 8; barbels short. *Assam.*
2. „ *guntea*, D. 2/7. A. 2/5; barbels long. *Orissa, Bengal* and *Barma.*

1. COBITIS GONGOTA.

Ham. Buch. Fish. Gang. pp 351, 394; Günther, vii, p. 363.

Cobitis cucura, Ham. Buch. pp. 352, 394; McClelland, Ind. Cyp pp. 303, 434, t. 51, f. 2, (from H B's MSS.), young; *Cuv. and Val xviii, p. 70.

Cobitis oculata, McClelland, Ind. Cyp. pp. 303, 433, t. 51, f. 1, from H. B.'s MSS., adult.

? *Cobitis maya*, Sykes, Trans. Zool. Soc. ii, p. 367.

? *Cobitis amnicola*, Cuv. and Val. xviii, p 68.

Somileptes gongota, *Swainson; Bleeker. Atl. Ich. Cyp. (no description).

B. III. D. 10. V. 7. A. 8.

Barbels moderately developed, extending about half way to below the eyes which are small, prominent, and somewhat before the middle of the length of the head. *Fins.*—Origin of dorsal opposite the root of the inner ventral ray; caudal rounded. *Scales* minute. *Colours.*—An undulated band along the side of the body, giving off vertical bars towards the back. Dorsal and caudal fins with transverse rows of blackish dots.

Hab. Assam.

2. Cobitis guntea.

Ham. Buch. Fish. Ganges. pp. 353, 394; McClelland, Ind. Cyp. pp. 303, 434, t. 51, f. 3. (from H. B.'s MSS.); Cuv. Val. xviii, p. 67; Günther, Catal. vii, p. 363; Day, Proc. Zool. Soc. 1869, p. 383.

Acanthopsis Berdmorei, Blyth, J. A. S. of Beng., 1860, p. 168.

? *Acanthopsis micropogon*, Blyth, l. c. p. 168.

Cobitis Berdmorei, Day, Proc. Zool. Soc. 1869, p. 550.

Kondaturi and *gupkari*, Uria; *Nga-tha-leg-doh*, Barmese.

B. III, D. 2/6-7. P. 9. V. 7. A. 2/5. C. 16.

Length of head 1/6, of pectoral 1/9, of caudal 1/6 of the total length. *Eyes*;—diameter 1/5 of length of head, 2 diameters from end of snout, and one diameter apart. Body strongly compressed; its height equal to the length of the head. Barbels large, well developed and all longer than the orbit. *Fins*.—Dorsal arises midway between the posterior margin of the orbit and the base of the caudal fin, its first three rays are in advance of the ventrals; caudal generally entire, its centre rays, however, may be somewhat shortened or even lengthened. *Scales* distinct. *Lateral line* absent.—*Colours*; generally dirty yellowish, with a dark band extending from the centre of the snout, and ending in a black ocellus above the middle of the base of the caudal fin; along this band are a series of dark blotches, whilst the back is similarly stained. Dorsal and caudal with rows of dark spots. I have obtained it at Kangra, coloured, as given by McClelland.

Hab.—From Orissa through Bengal and Barma, also in Bombay Presidency. It attains four inches in length.

Genus. 6. Lepidocephalichthys, *Bleeker*.

Platacanthus, Day.

Body elongated and moderately compressed. Eight barbels, two of which belong to the mandible. A large, erectile, bifid, suborbital spine. Dorsal fin short, commencing opposite, or nearly so, to the ventral; the internal ray of the pectoral fin may be modified into a flat osseous spine; caudal truncate or slightly emarginate.

Geographical distribution.—India, Barma and Ceylon.

Synopsis of species.

1. *Lepidocephalichthys thermalis*, D. 3/6. A. 2/5. S. *India* and *Ceylon*.
2. *Lepidocephalichthys balgara*, D. 8, A. 7. *Wynaad*, *Bengal* and *Assam*.

1. Lepidocephalichthys thermalis.

Cobitis thermalis, Cuv. and Val., xviii, p. 78.

Lepidocephalichthys thermalis, Bleeker in Verh. Holl. Maat. Haar. 1864, Cyprin. and Cobit. Ceylon, p. 6, t. i, f. 1; Günther, Catal. vii, p. 364; Day, Proc. Zool. Soc. 1869, p. 383.

Cobitis Mysorensis, Jerdon, M. J. L. and S., 1849, p. 332.
Platacanthus agrensis, Day, Fishes of Malabar, p. 204, pl. 14, f. i.

Assaree, Tam.; *Jubbi cowri*, Uriah; *Bálu*, Hind.

B. III. D. 3/6. P. 7. V. 7. A. 2/5. C. 16.

Length of head 1/11, of caudal 1/8, height of body 1/8 of the total length. Barbels eight, the longest extending to below the anterior margin of the orbit. Suborbital spine, strong. *Fins.*—Origin of dorsal slightly in advance of the ventral, and nearer the root of the caudal than the snout. Caudal slightly emarginate. The inner pectoral ray is modified in adult males into a flat osseous spine which is used for diving down into the mud. *Scales* distinct. I found 2,500 eggs in one female. *Colours*, sandy, with irregular blotches on the lateral line, and others along the back; a black spot generally exists, at the base of the upper half of the caudal fin. Dorsal fin with black spots, caudal with four bands. A dark streak often extends from the eye to the end of the snout.

Hab.—Southern India, the Malabar coast and Ceylon.

2. Lepidocephalichthys balgara.

Cobitis balgara, Ham. Buch., Fish. Gang. pp. 356, 394; Cuv. and Val., xviii p. 74.
Schistura balgara, McClell., Ind. Cyp., p. 307, pl. 53, f. 2. (from H. B.'s MS.).
" *aculeata*, McClell., l. c. p. 307; Cuv. and Val. xviii, p. 70.
Lepidocephalichthys balgara, Günther, Catal. vii, p. 365; Day, P. Z. S. 1870, p. 70.
? *Cobitis Carnaticus*, Jerdon, M. J. L. and S., 1849, p. 331.

Jubbi cowri, Uriah.

B. III. D. 2/6. V. 7. A. 2/5.

This species closely resembles the preceding. Suborbital spine small, and decreasing with age. Dorsal fin not in advance of the ventrals; caudal cut square. In one male specimen, taken in the Ganges at Hardwar, the inner pectoral ray was of the same character as in the last species. *Colours*, clouded with brown along the back, lighter on the abdomen; the whole of the body dotted over with lines of black spots; a black mark at the top of the base of the caudal. Six to eight rows of spots along the dorsal fin, and about ten sinuous and broken up lines of spots on the caudal.

Hab.—India generally. In some specimens from the Soane river, the mandibular barbels are sub-divided.

Genus. 7. Botia, *Gray*.

Hymenophysa, McClelland.

Body oblong, compressed, with the dorsal profile more or less convex. Eyes with a free, circular eyelid. Barbels six to eight; if six, all are on the snout and upper jaw, if eight the extra ones are on the mandible. A bifid, erectile, suborbital spine present. Dorsal fin commences anterior to the root of the ventral; caudal forked. Air bladder in two divisions, the

anterior being partially enclosed in a bony capsule, whilst the posterior portion floats free in the abdominal cavity.

Geographical distribution.—Found in the plains and hills in Eastern Bengal, and in both Upper and Lower Barma.

SYNOPSIS OF SPECIES.

1. *Botia nebulosa*, D. 3/12, A. 2/5, Barbels six. *Darjîling.*
2. *Botia dario*, D. 3/10, A. 2/6. Barbels eight. *Bengal, N. W. Provinces, Cachar.*
3. *Botia hymenophysa*, D. 13—15, A. 8. Barbels six. *Barma.*
4. *Botia Almorhæ*, D. 12, A. 8. Barbels eight. *Almorah.*
5. *Botia rostrata*, D. 12, A. 8. Barbels eight. *Assam.*
6. *Botia Berdmorei*, D. 2/9, A. 2/5. Barbels eight. *Darjîling.*
7. *Botia histrionica*, D. 2/8, A. 2/5. Barbels eight. *Pegu.*

1. BOTIA NEBULOSA.

Blyth, J. A. S. of B., 1860, p. 165; Day, Proc. Zool. Soc. 1869, p. 550.

B. III. D. 3/12. P. 13. V. 8. A. 2/5. C. 17.

Length of head 1/5, of caudal 1/5, height of body 1/5 of the total length. *Eyes*,—in the middle of the length of the head, two diameters from the end of the snout, and the same distance apart. *Colours*,—brownish, with a leaden band along the side. Dorsal and caudal barred in spots. An ocellus at the upper margin of the base of the caudal fin.

Hab.—Darjîling.

2. BOTIA DARIO.

Cobitis dario, Ham. Buch., Fish. Ganges, pp. 354, 394, pl. 29, f. 95; *Cuv. and Val., xviii, p 85; Bleeker, Verh. Bat. Gen. Ned. Ind., xxv. Beng. and Hind. p. 143; McClell. Ind. Cyp. pp *306, 444, pl 61, f. 8.

? *Cobitis geto*, Ham. Buch., l. c. pp. 355, 394, pl. xi, f. 96; Cuv. and Val. xviii, p. 84; McClell., Ind Cyp. pp. 306, 444, pl. 61, f. 9.

Botia dario, Günther, Catal. vii, p. 366.

Sahinga, Panj.; *Bucktea*, Hind.; *Shee-nharo*, Sind.

B. III. D. $\frac{3}{9-10}$. P. 14. V. 8. A. 2/6. C. 19.

Length of head 1/5, of caudal 1/5, height of body 1/5 of the total length. *Eyes*—small, situated in the anterior portion of the posterior half of the head, and from $1\frac{1}{2}$ to 2 diameters apart. *Barbels* eight. Posterior portion of air vessel free in the abdominal cavity. *Colours*;—seven or eight oblique bands descend from the back to the abdomen, and two or three, or even more, cross either lobe of the caudal fin. In some specimens, especially from the Jumna, there are about five vertical bands, which arch superiorly so as to coalesce with the next on either side, between each arch is an intermediate vertical blotch. Sometimes there are two bars on the pectoral and the same number on the ventral fins.

Hab.—Bengal, N. W. Provinces and the Panjab, also Cachar. I have generally taken it in the rivers of the plains, except in the Sind hills.

3. Botia hymenophysa.

Cobitis hymenophysa, Bleeker, Nat. Tyd. Ned. Ind. iii, p. 602.
Hymenophysa Macclellandi, Bleeker, Cyp. Prod. p. 63.
Botia hymenophysa, Bleeker, Atl. Ich. Cypr. p. 6, t i, f. 2; Günther, Cat. vii, p. 368.
Nga-tha-lay-doh and *Shoay-zagay*, Barmese.

B. III. D. $\frac{2}{11-13}$. V. 8. A. 2/6.

Length of head nearly 1/4 of the total length. *Eyes*—slightly behind the middle of the length of the head. Suborbital spine small, only reaching to below the middle of the eye. *Barbels* six. *Colours* brownish, with eleven darker cross bands.

Hab.—The northern portions of British and also Upper Barma.

4. Botia Almorhæ.

Gray, Zool. Misc. 1831, p. 8; Günther, Catal. vii, p. 367.
Botia grandis, Gray and Hardw. Ind. Zool ;* Cuv. and Val., xviii, p. 86; McClell. Cal. J. N. H., ii, p. 586.

B. III. D. 12. V. 8. A. 8.

Length of head 1/4, height of body nearly 1/4 of the length, excluding the caudal fin. *Eyes* in the middle of the length of the head, 2 diameters apart. Snout pointed, half as long as the head. Suborbital spine extending nearly or quite to behind the posterior margin of the orbit. *Barbels* eight. Free portion of the tail as deep as long. *Fins*;—dorsal commences midway between the end of the snout and the base of the caudal. *Colours*;—body reticulated with brown, the yellow ground colour being broken up into spots; all the fins with more or less regular brown cross bands, three or four on each caudal lobe, three across the anal fin, and about six across the pectoral.

Hab.—Almorah.

5. Botia rostrata.

Günther, Catal., vii, p. 367.

B. III. D. 12, P. 14, V. 8, A. 8.

Length of head 1/4, of caudal 1/5, height of body 1/5 of the total length. *Eyes*,—diameter 2/15 of length of head, 4 diameters from end of snout; interorbital space not quite equal to 2 diameters of the orbit. Snout pointed, longer than the remaining portion of the head. Suborbital spine not extending to below the posterior margin of the orbit. *Barbels* eight. Depth of free portion of tail $1\frac{1}{4}$ in its length. *Fins*;—dorsal arises midway between the posterior margin of the orbit and the base of the caudal, which last has sharp lobes. *Colours*;—body with irregular and partly confluent brown cross bands, which enclose variously sized round yellowish spots. Dorsal and anal fins with two, pectoral, ventral, and each lobe of the caudal with three, black cross bands.

Hab.—Bengal and Assam.

6. BOTIA BERDMOREI.

Syncrossus Berdmorei, Blyth, J. A. S. of Bengal, 1860, p. 166.
Botia Berdmorei, Day, Proc. Zool. Soc., 1869, p. 549.

B. III. D. 3/9, P. 13, V. 8, A. 2/5, C. 17.

Length of head 1/5, of caudal 1/5, height of body 1/5 of the total length. *Eyes;* diameter 1/5 of length of head, 2 diameters from end of snout and apart. Suborbital spine damaged in the unique example. *Barbels* eight. *Fins;* dorsal commences midway between the snout and the posterior margin of the anal fin. *Colours*, brownish, with a leaden band along the side. Dorsal and caudal barred in spots. An ocellus at the upper margin of the base of the caudal fin.

Hab.—Darjiling and Bengal generally.

7. BOTIA HISTRIONICA.

Blyth, J. A. S. of Bengal, 1860, p. 166; Day, Proc. Zool. Soc. 1869, p. 550.

B. III. D. 2/8, P. 15, V. 8, A. 2/5, C. 19.

Length of head 1/4, of caudal 1/5, height of body 1/4 of the total length. *Eyes;* diameter 1/5 of length of head, 2½ diameters from end of snout, 2 diameters apart. Suborbital spine not very strong, extending to opposite the posterior margin of the orbit. *Barbels*, eight. *Fins;* dorsal commences nearer to the caudal than to the end of the snout. Caudal forked. *Colours*, olive, with five dark vertical bands on the body, and two or three on the head. All the fins with two broad brown bands.

Hab.—Pegu.

Genus. JERDONIA,* *Day.*

Platacanthus, sp. Day.

Body elongated, and moderately compressed. Eight barbels, two of which are mandibular. A free, erectile, bifid, suborbital spine. Dorsal fin long (twenty-seven branched rays), commencing before the ventrals; the internal ray of the pectoral fin modified into a flat osseous spine; caudal slightly emarginate.

Geographical distribution. Madras Presidency.

THE SINGLE SPECIES.

1. *Jerdonia maculata*, D. 3/27, A. 3/6. *Madras.*

1. JERDONIA MACULATA.

Platacanthus maculatus, Day, Proc. Zool. Soc. 1867, p. 941, and 1870, p. 700.

B. III. D. 3/27, P. 5/1, V. 8, A. 3/6, C. 21.

Length of head 2/11, of caudal 1/5, height of body 1/6 of the total length. *Eyes;* diameter 1/6 of length of head, two diameters from end of snout. Dorsal profile ascends to the commencement of the dorsal fin. Suborbital spine reaches to beneath the anterior third of the orbit. *Scales*, small,

* This name has been also applied in Conchology and Ornithology, [*Editor.*]

but distinct. *Colours*, greyish, becoming dirty white along the abdomen. A dark lateral band extends from the eye to the tail; along its first half are three black spots, whilst the whole extent of the back is irregularly lineated. *Fins*, yellow. Dorsal with four black bands. Caudal with three bands and a dark margin. A black mark at the base of the tail, with a smaller one above and another below it.

Hab.—Madras.

B. *Without an erectile spine near the orbit.*

Genus. 9. NEMACHEILUS, *v. Hass.*

Acoura and *Acourus*, Swains.

Acanthocobitis, Peters.

Body elongated. Dorsal profile nearly horizontal. Barbels eight or six, when the former number is present, the extra pair belongs to the posterior nostril, none on the mandibles. No spine on the head. Dorsal fin of moderate length, or short, situated opposite the ventrals.

This genus has been subdivided into those species which have upwards of twelve dorsal rays, (*Acanthocobitis*), and those with less than twelve. As this arbitrary division is not a natural one, it is not adopted here. Another subdivision has been instituted into those in which the tail is forked, and those in which it is entire. The genus may, however, be subdivided into those with eight and those with six barbels.

Geographical distribution.—Fresh waters of India, Ceylon, and Barma.

SYNOPSIS OF SPECIES.

A. *With eight barbels.*

1. *Nemacheilus Evezardi*, D. 2/7, A. 2/5. Greenish, with small dark blotches. *Púna* (in the Dakhin).

B. *With six barbels.*

2. „ *pavonaceus*, D. 2/15, A. 2/5. Body barred; caudal wedge-shaped. *Assam* and *Tenasserim Provinces.*

3. * „ *urophthalmus*, D. 14, A. 7. Body with cross bands; caudal emarginate, and with rounded angles. *Ceylon.*

4. „ *botia*, D. 3/11, A. 2/5. Body irregularly blotched Caudal emarginate. *Throughout India, except in the South.*

5. „ *Rupelli*, D. $\frac{2-3}{10}$, A. 8. Short bars along the lateral line. Caudal emarginate. *Púna.*

6.* „ *moreh*, D. $\frac{2}{10}$, A. 7. Bars along the side of the body. Caudal wedge-shaped. *Púna.*

7.* „ *monoceros*, D. 12. A. 6. Caudal and dorsal fins barred. Caudal rounded. *Assam.*

8. „ *aureus*, D. 2/10, A. 2/5. Immature blotched; caudal and dorsal fins barred. Caudal forked. *Jabbalpúr.*

9. „ *rupicola*, D. $\frac{2}{8-9}$, A. 2/5. Eleven to seventeen brown bands on

the body, as wide or wider than the ground colour. Dorsal and caudal banded or spotted. Caudal forked. *India generally, except Sind and the South.*

10. " *semiarmatus*, D. 3/8, A. 2/5. Irregular spots and bars on the body and fins. Caudal forked. *Nilgherries.*

11.* " *tenuicauda*, D. 11, A. 7. Mottled and spotted with brown. Caudal forked. *Tibet.*

12. " *zonalternans*, D. 2/9, A. 2/5. Ten to eleven vertical bands, with intermediate ones superiorly. Dorsal and caudal spotted. Caudal entire. *Tenasserim provinces.*

13. " *Ladacensis*, D. 11, A. 7. Nine blackish bars across the back. Caudal rounded. *Tibet.*

14. " *zonata*, D. 3/7, A. 1/5. Eleven to thirteen dark zones encircle the back, not meeting on the abdomen and not half the width of the ground colour. Caudal forked. *Assam, Bengal, N. W. Provinces.*

15. " *subfuscus*, D. 2/8, A. 2/5. Ten brown zones encircling the body, and wider than the ground colour. Caudal slightly forked. *Upper Assam and Burma.*

16. " *sinuatus*, D. $\frac{2}{8-9}$, A. 2/5. Vertical brown bands, with shorter intermediate ones. Dorsal and caudal barred. Caudal cut square. *Wynaad.*

17. " *Stoliczkæ*, D. 3/7, A. 2/5. Spotted and marbled with brown. Caudal slightly emarginate. *Tibet.*

18. " *chlorosoma*, D. 3/6, A. 2/5. A darkish line long the middle of the body. Caudal cut square. *Upper Assam and Kistna river.*

19. " *phoxocheila*, D. 2/9, A. 2/5. *Upper Assam.*

20. " *serpentarius*, D. 2/8, A. 2/5. A dark band from snout through the eye to the base of dorsal fin.

21. " *microps*, D. 11, A. 7. Sixteen to seventeen cross bands on the back, and vermiculated stripes on the body. Caudal slightly emarginate. *Tibet.*

22. " *striatus*, D. 2/8, A. 2/5. Numerous narrow vertical bands. Caudal slightly forked. *Wynaad.*

23. " *mugah*, D. 2/7, A. $\frac{2}{5-6}$. Fifteen brown bands, one third as wide as the ground colour. Caudal forked. *Cossy river.*

24. " *notostigma*, D. 2/8, A. $\frac{2-3}{5}$. Dark blotches. Caudal forked. *Ceylon and Southern India.*

25. " *montanus*, D. 3/7, A. 2/5. Twelve vertical brown bands. Caudal forked. *Himalayas.*

26. " *spilopterus*, D. 2/7, A. 2/5. Eleven to fifteen irregular bands. Caudal slightly emarginate. *Himalayas, Assam and Cochin China.*

27. " *savona*, D. $\frac{2-3}{8}$, A. 2/5. Ten to twelve very narrow white bands. Caudal slightly emarginate. *Raniganj in Bengal.*

28. " *Beavani*, D. 10, A. 7. Dark bands, wider than interspace. Caudal forked. *Cossy river.*

29. " *Denisonii*, D. $\frac{2}{8-9}$, A. 2/5. Nine to twelve yellowish olive vertical zones. Caudal forked. *Nilgherry* and *Coorg hills.*

30. " *triangularis*, D. 2/8, A. 2/5. Seven black edged triangular bands. Caudal emarginate. *Travancore hills.*

31.* „ *marmoratus*, D. 10, A. 7. Mottled with brown. Caudal somewhat convex. *Kashmir.*

32. „ *Griffithii*, D. 10, A. 7. Marbled with brownish black. Caudal emarginate. *Assam.*

33. „ *corica*, D. 2/8, A. 2/5. About thirteen blotches along the side. Caudal forked. *N. E. Bengal, Panjab* and *Assam.*

34. „ *Guentheri*, D. 2/8, A. 2/5. Reticulated with brown. Caudal lobed. *Nilgherries.*

35. „ *Blythii*, D. 2/7, A. 2/5. Brownish. Caudal forked. *India ?*

36. „ *Butanensis*, D. 9, A. 7. Caudal rounded. *Bután.*

37. „ *rubripinnis*, D. 2/6, A. 2/5. Nine vertical bars. Caudal emarginate. *Malabar.*

38.* „ *turio*, D. 8, (10 ?) A. 7. Spotted and blotched. Caudal emarginate. *Assam.*

39.* *guttatus*, D. 8. Dark blotches. Caudal entire. *Upper Assam.*

1. Nemacheilus Evezardi.

B. III. D. 2/7, P. 12, V. 8, A. 2/5, C. 17.

Length of head 1/5, of caudal 1/5, height of body 1/6 of the total length. *Eyes* in the commencement of the anterior half of the head. *Head* broad, its width equalling its length without the snout, which is rounded. No spine on the head. *Barbels* well developed, one pair of nasal, two pair of rostral and one pair of maxillary. *Fins ;* dorsal commences opposite to the ventrals and midway between the anterior margin of the orbit and the base of the caudal; upper edge of dorsal fin slightly convex; pectoral longer than the head, and reaching three quarters of the distance to the base of the ventral. Caudal rounded. *Scales*, very minute. *Lateral line*, absent. *Colours*, greenish with small dark blotches.

Hab.—Púna. A single specimen received amongst a collection which Colonel Evezard assisted in procuring.

2. Nemacheilus pavonaceus.

Cobitis pavonacea, McClelland, Ind. Cyp., pp. 305, 437, pl. 52, fig. 1; *Cuv. and Val., xviii, p. 37.

Nemacheilus pavonaceus, *Günther, Catal. vii, p. 348.

Cobitis semizonata, Blyth, J. A. S. of B., 1860, p. 171.

Nemacheilus semizonatus, *Günther, Catal. vii, p. 348.

Cobitis rubidipinnis, Blyth, l. c., p. 170.

Nemacheilus rubidipinnis, *Günther, Catal. vii, p. 348.

Acanthocobitis longipinnis, Peters, Mon. Ak. Wiss. Berl. for 1861.

B. III. D. $\frac{2-3}{12-13}$, V. 8, A. 2/5, C. 19.

Length of head 1/5, of caudal 1/6, height of body 1/6 of the total length. *Eyes ;* diameter 2/9 of length of head, 2 diameters from end of snout. In some specimens the pre-orbital forms a blunt spine. *Fins ;*

dorsal commences nearer to the snout than to the base of caudal, which latter is slightly emarginate. *Colours;* body crossed by about twenty half bars of a darkish grey; a dark ocellus surrounded by a light margin exists upon the upper portion of the base of the caudal fin. Dorsal and caudal barred.

Hab.—Assam and Tenasserim Provinces.

3. Nemacheilus urophthalmus.

Günther, Catal. vii, p. 348.

B. III. D. 14, P. 13, V. 8, A. 7, C. 19.

Length of head, of caudal, and height of body 1/5 of the total length. *Eyes;* diameter 1/4 of length of head, $1\frac{1}{2}$ diameters from end of snout. Body, compressed. Free portion of tail as deep as long. Pre-orbital terminates posteriorly in a slight and obtuse projection below the eye, either moveable, or concealed by the skin. *Fins;* origin of dorsal midway between the snout and the base of the caudal, which latter is emarginate with rounded angles. *Scales*, distinct. *Lateral line*, incomplete. *Colours;* from ten to thirteen dark brown cross bands, somewhat lighter in the middle, and separated from one another by narrow yellow streaks of ground colour. Head spotted with brown. A black, white edged, ocellus on the base of the upper caudal lobe. Dorsal and caudal with six transverse series of black dots.

Hab.—Ceylon.

4. Nemacheilus botia.

Cobitis botia, Ham. Buch., Fish. Ganges, pp 350, 394; *Cuv. and Val., xviii, p. 72.
" *bilturio*, Ham. Buch., l. c. pp. 358, 395; *Cuv. and Val., xviii, p 35.
" *bimucronata*, McClell., Ind. Cyp., pp. 304, 435, pl. 51, fig. 4, (from H. B.'s MS.)
" *ocellata*, McClell., l. c. pp. 304, 436, pl. 51, fig. 6, (from H. B.'s MS.)
Nemacheilus botia, Günther, Catal. vii, p. 349; Day, P. Z. S., 1869, p. 382.

Bil-turi, Assam; *Soon-da-lee*, Panj.

B. III. D. 3/11, P. 11, V. 8, A. 2/5, C. 17.

Height of body 1/6 of the total length. Pre-orbital has in some specimens a projection which is moveable below the orbit, (*N. botia*), whilst in others it is entirely concealed by the skin (*N. bilturio*). *Colours*, greyish, with from 12 to 14 short bars on the lateral line, and a number of irregular blotches above it. Dorsal fin spotted; caudal with about seven irregular bars, and a black ocellus on the upper portion of the base of the fin.

Hab.—Throughout India, except its most southern portion.

The *Cobitis scaturigina*, McClell., described from one of H. B.'s drawings may be this species, badly delineated, the ocellus at the base of the caudal and the bars on that fin not being distinctly shown.

5. Nemacheilus Rupelli.

Cobitis Rupelli (?) Sykes, Trans. Zool. Soc. ii, p. 366, pl. 64, fig. 1.

B. III. D. $\frac{2-3}{10}$, P. 12, V. 8, A. 8, C. 19.

Length of head 2/11, of caudal 1/5, height of body 1/5 of the total length. *Eyes*, slightly before the middle of the length of the head, 2¼ diameters from end of snout. Head pointed, four moderately developed rostral and two maxillary barbels. *Fins;* dorsal arises midway between the snout and base of the caudal which is slightly forked; the upper margin of the dorsal fin straight. *Scales*, moderately developed. *Lateral line*, distinct. *Colours*, greenish yellow except the abdomen which is white, short brown bars along the lateral line, and the rays of the dorsal and anal barred. Caudal with four posteriorly directed V-shaped brown bars. A black spot at the base of the upper caudal lobe.

Hab.—Rivers near Púna (in the Dakhin).

6.* Nemacheilus moreh.

Cobitis moreh, Sykes, Trans. Zool. Soc. ii, p. 366.

B. III. D. $\frac{2}{10}$, P. 12, V. 8, A. 7, C. 19.

Head said to be more pointed than in the last species. *Fins;* tail wedge-shaped. *Scales*, minute. *Colours;* more dark blotches on the head than in *N. Rupelli.* The transverse dark marks on the body are not (? now) arranged along the lateral line and over the back, alternating with each other. The fins have a very light orange tinge.

Hab.—Mota Mola river at Púna.

7.* Nemacheilus monoceros.

Cobitis monoceros, McClell., Ind. Cyp., pp. 305, 438, pl. 52, fig. 2; *Cuv. and Val., xviii, p. 38.

Nemachilus monoceros, *Günther, Catal. vii, p. 358.

B. III. D. 12, P. 12, V. 8, A. 6, C. 18.

Length of head 1/4 of the total without the caudal fin. A short blunt spine on the snout. *Fins* (according to the figure); upper margin of dorsal nearly straight, caudal rounded. *Colours;* body greenish yellow with a silvery lustre, opercles tinged with green. Caudal and dorsal streaked with numerous small brown bars.

Hab.—Assam.

8. Nemacheilus aureus.

B. III. D. 2/10, P. 15, V. 8, A. 2/5, C. 19.

Length of head, of caudal and pectoral 1/5, height of body 2/13 of the total length. *Eyes*, large, not prominent, situated in the middle of the length of the head and 1½ diameters from the end of snout. Snout very

obtuse, the pre-orbital (in the adult) ending posteriorly in a free blunt process. Width of head two-thirds of its length. Free portion of tail as high as long. *Barbels* elongated, the internal rostral pair reaching to the eye, the external to the middle of the orbit, and the maxillary to beyond its hind margin. *Fins;* dorsal commences somewhat in advance of the ventrals, and in the adult midway between the snout and the base of the caudal, but in the immature nearer to the former; the pectoral reaches to above the ventral, and the anal when laid flat extends to the root of the caudal, which last is forked in its last fourth with sharp lobes. *Scales,* very distinct. *Lateral line,* ceases opposite the posterior end of the base of the dorsal. *Colours,* light, with a green tinge and destitute of marks on the body in the mature, but in the young there is a row of seven or eight dark blotches along the middle of the body as wide as the ground colour, whilst superiorly there are intermediate blotches extending downwards from the back. Fins and the barbels of a deep orange colour, a dark ocellus at the base of the upper caudal lobe, and 5 or 6 7 shaped bars on the tail. Several rows of black spots along the dorsal fin. A dark streak from the eye down the snout.

Hab.—Jabbalpúr, specimens obtained in September 1871 were full of ova.

9. Nemacheilus rupicola.

Schistura rupicola, McClell., J. A. S. of B., vii, pl. pl. 55, fig. 3, and Ind. Cyp. pp. 309, pl. 57, fig. 3.

Cobitis rupecula, *Cuv. and Val., xviii, p. 40.

Nemachilus rupecula, Günther, vii, p. 351.

B. III. D. $\frac{2}{8-9}$, P. 10, V. 7, A. 2/5, C. 17.

Length of head 1/5, of caudal 1/5 to 1/6, height of body 1/5 to 1/6 of the total length. *Eyes* small, diameter 1/7 of the length of the head and situated in the middle of its length, or more anteriorly in young specimens. *Head,* broad, depressed. *Barbels,* short but stout. *Fins;* dorsal commences midway between the posterior margin of the orbit and the base of the caudal fin. Pectoral reaches above half way to the root of the ventral; caudal with rounded lobes in the adult, more pointed in the young. Free portion of the tail as deep as long. *Scales,* minute. *Colours;* eleven to seventeen vertical brown bands, each from as wide to three times as broad as the buff interspaces. Caudal with a black band at its base, and four or five irregular bars. Dorsal with a black base and a black mark between its two first rays, the fin also spotted with black, the other fins with badly marked bands.

Hab.—Bengal, N. W. Provinces, Panjáb, Assam, and the Himalayas; attaining 3½ inches in length.

The appearance of this fish alters considerably with age. In the young the head is only 2/3 as wide as long, but the two dimensions are equal in the adult.

10. Nemacheilus semiarmatus.

Day, Proc. Zool. Soc. 1867, p. 286; Günther, Catal. vii, p. 353.

B. III. D. 3/8, P. 12, V. 7, A. 2/5, C. 18.

Length of head 2/11, of caudal 2/9, height of body 2/11 of the total length. *Eyes;* diameter 1/4 of length of head, 1½ diameters from end of snout, 1 diameter apart. A cartilaginous knob on pre-orbital. Free portion of tail as deep as long. *Fins;* origin of dorsal nearer the snout than the base of the caudal. Pectoral as long as the head, the basal half of some of its rays being generally stiffened by osseous matter. Caudal lobed in its last half. *Scales*, indistinct. *Lateral line*, complete. *Colours*, light brown, with numerous irregularly shaped spots and bars proceeding from the back towards the lateral line; head brownish, with a dark line from the snout through the orbit. Dorsal fin with about three rows of dark spots; caudal irregularly barred; a dark line runs along the centre of the back.

Hab.—Bowani and Sigur rivers along the base of the Nilgherry hills; also imported into tanks on those mountains.

11.* Nemacheilus tenuicauda.

Cobitis tenuicauda, Stein., Verh. Zool.-bot. Ges. Wien, 1866, p. 792, t. 17, fig. 3.
Nemachilus tenuicauda, Günther, Catal. vii, p. 357.

B. III. D. 11, V. 8, A. 7.

Length of head nearly 1/5, height of body less than 1/5 of the length, without the caudal. Free portion of tail very low, its depth being rather less than 1/3 of its length. *Fins;* upper margin of dorsal oblique, with its anterior angle rounded; it arises nearer to the root of the caudal than to the end of the snout. Pectoral extends rather above half the distance to the base of the ventral. Caudal emarginate. *Scales*, absent. *Colours;* upper part of side, dorsal and caudal fins irregularly mottled with brown, and some spots along the sides.

Hab.—Tibet.

12. Nemacheilus zonalternans.

Cobitis zonalternans, Blyth, J. A. S. of B. 1860, p. 172.
Nemacheilus zonalternans, Day, Proc. Zool. Soc., 1869, p. 551.

B. III. D. 2/9, A. 2/5.

Eyes of moderate size, rather above one diameter from end of snout. *Fins;* dorsal commences rather nearer the snout than the base of the caudal, which latter is entire. *Scales*, distinct. *Colours;* ten to eleven bars descend down the lower two-thirds of the body to the abdomen, with intermediate half bands superiorly between them. Dorsal and caudal fins spotted in bands.

Hab.—Tenasserim Provinces.

13. NEMACHEILUS LADACENSIS.

Nemachilus ladacensis, Günther, Catal. vii, p. 356.

B. III. D. 11, V. 8, A. 7.

Length of head 1/5, height of body less than 1/5 of the total length without the caudal fin. *Eyes;* diameter 1/5 of length of head, 2 diameters from end of snout. Snout obtuse. Free portion of tail one-fourth as high as long. *Fins;* upper margin of dorsal oblique, with its anterior angle rounded, commencing nearer the end of the snout than the root of the caudal, which latter is rounded. Pectoral extends rather above half way to the base of the ventral. All the fins are somewhat elongated. *Scales*, absent. *Colours*, reddish olive, with about nine blackish bars across the back, a few small scattered spots upon the sides and caudal fin.

Hab.—Tibet, from whence the single typical specimen, three inches long, was procured.

14. NEMACHEILUS ZONATA.

Schistura zonata, Mc.Clell., Ind. Cyp., pp. 308, 441, pl. 53, fig. 1.
Cobitis zonata, *Cuv. and Val., xviii, p. 39.

B. III. D. 3/7, P. 11, V. 8, A. 1/5, C. 17.

Length of head 1/5, of caudal 1/5, height of body 1/6, of dorsal fin a little above 1/6 of the total length. *Eyes;* diameter 2/7 of length of head, and situated in the middle of its length. Snout rather compressed. *Barbels* well developed, being about as long as the orbit. *Fins;* dorsal commences rather nearer the base of the caudal, than the end of the snout. Caudal forked. *Colours;* eleven to thirteen dark zones encircle the back, but they do not meet on the abdomen, and are not half the width of the ground colour.

Hab.—Upper Assam, Bengal, and N. W. Provinces.

15. NEMACHEILUS SUBFUSCUS.

Schistura subfusca, Mc.Clell., Ind. Cyp. pp. 308, 443, pl. 53, fig. 5.
Cobitis subfuscus, *Cuv. and Val., xviii, p. 80.
Nemachilus subfuscus, *Günther, Catal. vii, p. 351.
Cobitis cincticauda, Blyth, J. A. S. of B. 1860, p. 172.
Nemacheilus cincticauda, Day, Proc. Zool. Soc. 1869, p. 552.

B. III. D. 2/8, P. 11, V. 8, A. 2/5, C. 19.

Length of head 1/5, of pectoral 1/5, of caudal 2/11, height of body 1/7 of the total length. *Eyes*, situated in the middle of the length of the head, 3 diameters from end of snout, $1\frac{1}{2}$ diameters apart. *Barbels* well developed, and nearly as long as the orbit. No projection on the pre-orbital. The free portion of the tail longer than high. *Fins;* dorsal with its upper margin straight, it arises midway between the posterior margin of the orbit and the base of the caudal, which last is slightly emarginate. Pectoral extends

three-fourths of the distance to the ventral. *Scales*, minute. *Colours*, yellowish, with ten regular brown zones encircling the body and broader than the ground colour; a dark bar at the base of the caudal, and a dark band between the eye and the mouth. Dorsal with some black spots.

Having obtained numerous specimens in Barma, since my paper in the Proc. Zool. Society was published, I have been enabled to compare them with Mr. Blyth's typical one, and Mc.Clelland's description and figure, leaving no doubt as to their specific identity.

Hab.—Upper Assam and Barma.

16. Nemacheilus sinuatus.

Day, Proc. Zool. Soc. 1870, p. 371.

B. III. D. 2/8-9, P. 12, V. 8, A. 2/5, C. 18.

Length of head 1/5, of caudal 1/6, height of body 1/6 of the total length. *Eyes*, situated in the middle of the length of the head, 2 diameters from end of snout, 1½ diameters apart. *Barbels*, long and thin. *Fins*; dorsal arises slightly in advance of the ventrals, and midway between the snout and the base of the caudal, which last is cut square, but some of the outer rays are rather the shortest. *Scales*, distinct. *Lateral line* ceases opposite the end of the dorsal fin. *Colours*, olive, with irregular vertical brown bands, having shorter intermediate ones. A black ocellus at the base of the upper portion of the caudal fin. Dorsal yellow, with three or four rows of black spots. Caudal orange with four 7 shaped bars, the centre of each of which however is inverted.

Hab.—Wynaad.

17. Nemacheilus Stoliczkæ.

Cobitis Stoliczkæ, Stein., Verh. Zool.-bot. Ges. Wien, 1866, p. 793, t. 14, fig. 2.
Nemacheilus Stoliczkæ, *Günther, Catal. vii, p. 360.

B. III. D. 3/7, V. 8, A. 2/5.

Length of head 1/5 of total without the caudal, height of body much less. *Eyes*; diameter 2/11 of length of the head. *Fins*; origin of dorsal nearer root of caudal than end of snout, its upper margin oblique with the anterior corner rounded. Caudal slightly emarginate. Pectoral extends a little above half way to the root of the ventral. *Scales*, absent. *Colours*, darkish, spotted and marbled all over with a darker colour.

Hab.—Tibet, 15,500 feet above the level of the sea.

18. Nemacheilus chlorosoma.

Cobitis chlorosoma, McClelland, Ind. Cyp., pp. 305, 437, t. 52, fig. 3; *Cuv. and Val., xvii; p. 88.

Wattara, Tel.

B. III. D. 3/6, P. 11, V. 7, A. 2/5, C. 16.

Length of head 1/7, of caudal 2/11, height of body 2/11 of the total length. *Eyes*, high up, diameter 2/9 of length of head, 2 diameters from end of snout, ½ a diameter apart. Snout somewhat swollen, barbels about equal in length to the diameter of the eye. *Fins;* dorsal arises midway between the posterior margin of the orbit and the base of the caudal. The anal in the last third of the body. Caudal cut square. *Scales*, distinct. *Lateral line*, absent. *Colours*, straw coloured with a badly developed dark line along the centre of the body, and irregular greyish pencillings along the back. Pectoral, ventral, and anal yellowish; dorsal with several irregular and badly marked black bands. Caudal with a dark mark at its base, and several irregularly directed vertical bands.

Hab.—Upper Assam. The specimen from which this description is drawn up was taken at the Bezwada anicut on the Kistna, and it agrees moderately well with McClelland's figure and definition.

19. Nemacheilus phoxocheila.

Cobitis phoxocheila, McClelland, Ind. Cyp., pp. 305, 439, t. 52, fig. 4; *Cuv. and Val., xvii; p. 79.

Nemachilus phoxocheila, *Günther, Cat., vii, p. 361; Day, Proc. Zool. Soc. 1869, p. 551.

B. III. D. 2/9, A. 2/5.

Length of head more than height of body. *Eyes*, situated before the middle of the length of the head, and 2 diameters from end of snout. Snout rather depressed, no ridge between the orbits. *Barbels;* four rostral, as long as the diameter of the orbit, and two shorter maxillary ones. *Fins;* dorsal commences midway between the anterior margin of the orbit and the base of the anal, and slightly in advance of the ventral. The pectoral does not reach the ventral, nor the latter the anal. *Scales*, minute. The two specimens from which this description was drawn up were labelled as above in the Calcutta Museum, but their colours were bleached, whilst their tails were destroyed. The caudal fin should be rounded and entire.

McClelland's description gives an apparently different fish; he says that the head is raised obliquely as in the *Perilamps*, but this is a frequent *post-mortem* appearance; the ridge between the eyes being sharp and bony. *Colours*, above clouded with brown, silvery beneath, with a dark nebulous streak along the side. Several small bars across the caudal fin.

D. 8, P. 8, V. 6, A. 6, C. 16, and according McClelland only four barbels.

Hab.—Mishmi mountains in Northern Assam.

20. Nemacheilus serpentarius.

Day, Proc. Zool. Soc. 1869, p. 551.

B. III. D. 2/8, P. 17, V. 9, A. 2/5, C. 19, L. l. 64, L. tr. 12/17.

Length of head 1/5, of caudal 1/5, height of body nearly 1/5 of the total length. *Eyes*, small, behind the middle of the length of the head,

about four diameters from end of snout, and three diameters apart. *Snout*, pointed. *Barbels*, short, the maxillary pair the longest. Upper lip fimbriated. *Scales*, distinct, with a raised keel along their centre. *Lateral line*, complete. *Fins ;* dorsal arises slightly in advance of the ventrals, and midway between the snout and the base of the caudal fin, its upper margin straight. Pectoral reaches two-thirds of the distance to the ventral, and the latter above half way to the anal. Caudal deeply emarginate, its lobes pointed. *Colours*, brownish, with a wide dark chestnut band passing from the snout through the orbit to the base of the dorsal fin, which last has a black centre. Caudal deep brown with white margins. A black bar across the base of the ventrals.

Hab.—Doubtful, three specimens are in the Calcutta Museum.

21. Nemacheilus microps.

Cobitis microps, Stein, Verh. Zool-bot. Ges. Wien, 1866, p. 794, t. 13, f. 3

Nemachilus microps, *Günther, Catal. vii, p. 357.

B. III. D. 11, V. 8, A. 7.

Length of head 1/5 of total without the caudal; height of body less. *Eyes*, small, in middle of length of head. *Head*, broad, depressed. *Snout*, thick. *Fins ;* dorsal arises rather nearer the root of the caudal than the end of the snout. Caudal slightly emarginate. Pectoral reaches half way to the base of ventral. *Scales*, absent. *Colours ;* body with many narrow, vermiculated transverse stripes, which on the back coalesce, and form sixteen or seventeen broad cross bands.

Hab.—Tibet, 16,000 feet above the sea.

22. Nemacheilus striatus.

Day, Proc. Zool. Soc. 1867, p 847 ; *Günthor, Catal. vii, p. 353.

Cul-irum, and *Kul nakura*, Tamil.

B. III. D. 2/8, P. 11, V. 8, A. 2/5, C. 17.

Length of head, pectoral and caudal, each 1/7 of the total length. Height of body 1/11 of the total length. *Eyes*, diameter nearly 1/4 of length of head. *Barbels*, well developed, the external rostral pair reaching the posterior, and the internal to the anterior margin of the nostrils, to beneath which same place the maxillary ones extend. *Fins ;* dorsal arises slightly in advance of the ventrals, and midway between the snout and the posterior extremity of the caudal fin ; the caudal slightly lobed at its posterior extremity. *Scales*, well developed. *Lateral line*, well marked. *Colours*, light reddish brown, with narrow vertical bands darker than the ground colour, and most distinct in the posterior portion of the body, where there are sixteen posterior to the commencement of the dorsal fin, and several more between that and the head, which last is marked all over with black lines

and spots. A black band at the base of the caudal fin. Dorsal brilliant orange, with a black edge having a light external margin, and a dark base. Anal orange with some dull black spots; caudal likewise yellow and spotted.

Hab.—Wynaad at 3,000 feet elevation. It grows to $2\frac{1}{2}$ inches in length.

23. Nemacheilus mugah.

Day, Proc Zool. Soc. 1869, p. 382.

Mugah, Beng.

B. III. D. 2/7, P. 11, V. 8, A. $\frac{2}{5-6}$, C. 17.

Length of head 1/5, of pectoral 1/7, of caudal 1/5, height of body 2/13 of the total length. *Eyes*, diameter 1/5 of length of head, two diameters from end of snout, $1\frac{1}{2}$ diameters apart. Body with compressed sides. The free portion of the base of the caudal as long as high. Snout pointed; no enlargement of pre-orbital. *Barbels*, all about as long as the eye. *Fins;* dorsal arises midway between snout and base of caudal, its upper margin is straight; pectorals extend above half way to the base of ventrals; caudal emarginate in its posterior length. *Scales*, small, but distinct; there being twelve rows above the lateral line, and thirteen between it and the base of the ventral fin. *Lateral line*, commences by two roots, which soon coalesce, when it is continued to the base of the caudal. *Colours*, yellowish, with a green tinge; about fifteen brown bands, one-third as wide as the ground colour, pass across the back and descend on either side below the lateral line; a few near the head, and some in the posterior third of the body are interrupted. Upper surface of head marbled with black. Fins immaculate, but the two anal rays are black anteriorly, and there are also slight black marks near the end of the ventrals and on the outer side of the pectorals. Rostral barbels orange.

Hab.—Cossy river at Midnapore, where it attains two inches in length.

24. Nemacheilus notostigma.

? Bleeker, Verh. Holl. Maatsch. Haarl, 1864, Cobit. et Cyp. Ceylon, p. 5, t. 1, fig. 2; Günther, Catal. vii, p. 352.

B. III. D. 2/8, V. 7, P. 13, A. $\frac{2-3}{5}$, C. 19.

Length of head 1/5, of pectoral 1/7, of caudal 1/4, height of body 1/8 of the total length. *Eyes*, diameter 1/4 of length of head, $1\frac{1}{2}$ diameters from end of snout. Body elongated and compressed. Pre-orbital somewhat moveable and slightly enlarged at its posterior angle close to the orbit. *Barbels*, all longer than the eye. *Fins;* dorsal highest in front, it arises midway between snout and base of the caudal fin, being a little in advance of the ventrals; caudal with pointed lobes in its posterior third.

Scales, moderately distinct. *Colours*, brownish with dark blotches, almost bands, on the upper half of the body, and some also upon the fins. Occiput nearly black. A dark mark at the base of the caudal, which is irregularly banded. A black spot at the base of the anterior dorsal rays, and a bar across the lower portion of the fin.

Hab.—Cauvery above Trichinopoly, also ? Ceylon.

25. Nemacheilus montanus.

Schistura montana, McClell., Ind. Cyp. pp. 307, 440, t. 57, fig. 1.
Cobitis montana, *Cuv. and Val., xviii, p. 69.
? *Nemacheilus montanus*, Günther, Catal. vii, p. 350.

Saant-al, Panj.

B. III. D. 3/7, P. 10, V. 8, A. 2/5, C. 18.

Length of head 1/6, of caudal 1/6, height of body 1/8 of the total length. *Eyes*, small, in the middle of the length of the head. *Head*, rather above half as wide as long. Free portion of tail as deep as long. *Fins;* the dorsal's upper margin straight and oblique, it commences midway between the anterior margin of the orbit and the base of the caudal fin; pectoral extends a little above half the distance to the ventral. Caudal with rounded lobes. *Scales*, absent. *Colours*, yellowish, with twelve vertical brown bands, much narrower than the intermediate ground colour, and decreasing in width below the lateral line; a dark band across the base of the caudal, which fin as well as the dorsal has a single row of indistinct spots forming a sort of greyish band; a dark mark at the base of the anterior dorsal rays.

Hab.—Himalayas.

26. Nemacheilus spilopterus.

Cobitis spilopterus, Cuv. and Val., xviii, p. 27, pl. 522.
Nemachilus spilopterus, Günther, Catal., vii, p. 358.

B. III. D. 2/7, P. 10, V. 7, A. 2/5, C. 19.

Length of head 2/11, of caudal 1/7 of the total length. Height of body scarcely equals the length of the head. *Eyes*, near the summit of the head and in the middle of its length. *Barbels*, short. Free portion of tail about twice as long as high. *Fins;* dorsal with an oblique upper margin, it commences midway between the end of the snout and the root of the caudal. Pectoral reaches half way to the base of the ventral. Caudal very slightly emarginate. *Scales*, absent. *Colours*, greenish yellow, with from eleven to fifteen irregular bands crossing the back, and a black band across the root of the caudal fin. A black blotch at the base of the three first dorsal rays.

Hab.—Himalayas, Assam and Cochin China.

27. NEMACHEILUS SAVONA.

Cobitis savona, Ham. Buch., Fish. Ganges, pp. 357, 394; McClelland, Ind. Cyp., pp. 308, 442, pl. 53, fig. 3, (from H. B.'s MS.); *Cuv. and Val., xviii, p. 32.

Nemachilus savona, *Günther, Catal., vii, p. 354.

Savon-khorka, Beng.

B. III. D. $\frac{2-3}{8}$, P. 10, V. 7, A. 2/5, C. 19.

Length of head 2/9, of caudal 1/6, height of body 1/6 of the total length. *Eyes*, rather large in the anterior half of the head, and 1½ diameters from end of snout. *Head*, as broad as it is long without the snout. *Barbels*, long, the four rostral and two maxillary ones reach the eye. *Fins;* dorsal with its upper edge rather convex, it arises midway between the anterior edge of the orbit and the base of the caudal fin, and its commencement is before the origin of the ventrals. Pectoral extends two-thirds of the distance to the ventrals, which last does not reach the anal. Caudal very slightly emarginate, its lobes being rounded. *Lateral line*, incomplete. *Scales*, small, most distinct in the posterior portion of the body. *Colours*, brown, becoming lighter on the abdomen, having from ten to twelve very narrow vertical white bands, not above 1/8 or 1/6 as wide as the ground colour, a black band at the root of the caudal fin; a black blotch at the base of the first few dorsal rays, and four or five rows of dark spots on the fin. Caudal with narrow bands of dark spots.

Hab.—Bengal. I received some specimens from the hills near Raniganj.

28. NEMACHEILUS BEAVANI.

Nemacheilus beavani, Günther, Catal. vii, p. 350.

B. III. D. 10, P. 11, V. 7, A. 7, C. 19.

Length of head 2/9, of caudal 2/9, height of body 2/11 of the total length. *Eyes*, small, in the middle of the length of the head. Free portion of the tail rather longer than deep. *Barbels*, six, four rostral and two maxillary. *Fins;* dorsal with an oblique upper edge, it arises midway between the end of the snout and the base of the caudal. Pectoral extends two-thirds of the distance to the root of the ventral. Caudal lobed. *Colours;* body with nine dark cross bands, broader than the lighter interspaces, a black streak across the root of the caudal. Dorsal and caudal rays with blackish dots.

Hab.—Cossy river up to 2 inches long.

29. NEMACHEILUS DENISONII.

? *Cobitis montanus*, Jerdon, M. J. L. and S. 1849, p. 332 (not McClelland).

Nemacheilus Denisonii, Day, Proc. Zool. Soc. 1867, p. 287; Günther, Catal. vii, p. 352.

B. III. D. $\frac{2}{8-9}$, P. 11, V. 7, A. 2/5, C. 17.

Length of head 2/9, of caudal 2/9, height of body 2/13 of the total length. *Eyes;* diameter 1/5 of length of head, 2 diameters from end of snout, 1 diameter apart. *Barbels,* short. *Fins;* the dorsal commences midway between the end of snout and base of caudal, which last is lobed. Pectoral extends two-thirds of the distance to the ventrals. *Scales,* minute. *Lateral line,* complete. *Colours,* reddish brown, having from nine to twelve yellowish olive vertical zones, those anterior to the dorsal fin coalescing rather irregularly across the back. Dorsal fin with three rows of fine black spots. Caudal irregularly spotted in bands. Some dull spots on the ventral and anal fins. Most of the head marbled with black dots.

Hab.—Nilgherry and Coorg hills, and rivers at their bases.

A variety of this species with longer barbels exists in Mysore, where it attains four inches in length.

30. Nemacheilus triangularis.

Day, Proc. Zool. Soc. 1865, p. 295, and Fishes of Malabar, p. 203, pl. 14, fig. 1; Günther, Catal. vii, p 352

B. III. D. 2/8, P. 11, V. 9, A. 2/5, C. 19.

Length of head 1/5, of caudal 1/5, height of body 1/4 of the total length. *Eyes;* diameter 1/4 of length of head, 2 diameters from end of snout and one apart. *Barbels,* short. Free portion of tail rather deeper than long. *Fins;* upper margin of dorsal fin oblique, it commences midway between the end of the snout and the base of the caudal, which latter is emarginate. *Scales,* distinct. *Lateral line,* complete. *Colours,* yellowish, with about seven black edged bands on the body disposed in a 7 shape; likewise, one passes over the opercles, a second through the eye, a third from the orbit to the angle of the mouth. Dorsal with three irregular rows of black spots. Pectoral, ventral, and anal unspotted, but stained at their margins. Three oblique bars across each lobe of the caudal which has a black mark at its base.

Hab.—Travancore hills.

31.* Nemacheilus marmoratus.

Cobitis marmorata, Heckel, Fisch. Kaschmir, p. 76, t. 12, figs. 1—2, and Hügel, Kaschmir, iv, p. 380; *Cuv. and Val. xviii, p. 41.

Cobitis vittata, Heckel, l. c. p. 80, figs. 3, 4; and Hügel, Kaschmir, iv, p. 382; *Cuv. and Val., xviii, p. 42.

Nemachilus marmoratus, *Günther, Catal. vii, p. 356.

B. III. D. 10, V. 7, A. 7.

Length of head 2/9, height of body less than 2/9 of the length without the caudal fin. *Eyes,* small, situated in the middle of the length of the head. Free portion of tail not elongated. *Fins;* upper margin of dorsal fin oblique, its commencement being nearly midway between the end of the

snout and the root of the caudal, which latter is somewhat convex at its extremity. Pectoral reaches rather above half way to the root of the ventral. *Scales*, absent. *Colours;* mottled with brown. In some specimens a dark band exists along the body and some bars over the back of the tail. *(N. vittata.)*

Hab.—Kashmir.

32. Nemacheilus griffithii.

Günther, Catal., vii, p. 360.

B. III. D. 10, P. 11, V. 8, A. 7, C. 15.

Length of head 1/6, of caudal 1/6, height of body 1/8 of the total length. *Eyes;* diameter 1/7 of length of head, 3 diameters from end of snout, which is produced. Free portion of tail low, its depth being 1/3 of its length or even less. *Fins;* upper margin of dorsal oblique, with its anterior superior angle rounded, it commences midway between the end of the snout and the root of the caudal, which latter is emarginate. Pectoral reaches rather above half way to the root of the ventral. *Scales*, present. *Lateral line*, complete. *Colours;* sides of the body, dorsal and caudal fins irregularly marbled with brownish black, several similar bands cross the back.

Hab.—Probably Assam, attaining 5½ inches in length.

33. Nemacheilus corica.

Cobitis corica, Ham. Buch., Fish. Ganges, pp. 359, 395; *Cuv. and Val., xviii, p. 36.
Schistura punctata, McClell., Ind. Cyp. pp. 308, 442, pl. 53, fig. 4, (from H. B.'s MS).
Nemachilus corica, *Günther, Catal., vii, p. 361.

Khorika, Beng.

B. III. D. 2/8, P. 13, V. 8, A. 2/5, C. 17.

Length of head 2/11, of caudal 1/5, height of body 1/6 of the total length. *Eyes*, of moderate size, in the middle of the length of the head. *Barbels*, well developed, the external rostral pair longer than the orbit. *Fins;* dorsal commences anterior to the ventral and nearer the snout than the base of the caudal, which last is lobed in its posterior half, the lower being the longer. Upper margin of dorsal fin oblique. Third and fourth pectoral rays produced, reaching the base of the ventral fin. *Scales*, visible in the posterior half of the body. *Colours*, bluish, with about thirteen black blotches along the middle of the side, and smaller ones above and descending to between them.

Hab.—N. E. Bengal, Panjab and Assam.

34. Nemacheilus guentheri.

Day, Proc. Zool. Soc. 1867, p. 285; Günther, Catal. vii, p. 361.

B. III. D. 2/8, P. 11, V. 7, A. 2/5, C. 19.

Length of head 2/11, of caudal 2/13, height of body 1/7 of the total length. *Eyes;* diameter 2/7 of length of head, 1½ diameters from end of snout, 1 diameter apart. Head rather compressed. Free portion of tail longer than deep. *Fins;* upper margin of dorsal oblique, the fin commences midway between the end of the snout and the base of the caudal, which last is lobed. Pectoral extends three-fifths of the distance to the base of the ventral. *Scales,* distinct. *Lateral line,* incomplete. *Colours,* pinkish, coarsely reticulated with olive brown markings, leaving three rows of large spots along the side; a black band at the base of the caudal fin, which has two indistinct dark bands across either lobe, the extremities of which are stained. Two rows of fine black dots along the dorsal fin, and one across the anal.

Hab.—Rivers along the lower slopes, and base of the Nilgherry hills.

35. Nemacheilus blythii.

Day, Proc. Zool. Soc., 1869, p. 552.

B. III. D. 2/7, V. 9, A. 2/5, C. 19.

Length of head 1/5, of pectoral 1/5, of caudal 1/5, height of body 2/13 of the total length. *Eyes;* diameter 2/9 of length of head, 1 diameter from end of snout, 1¼ apart. *Barbels,* longer than one diameter of the orbit. *Fins;* dorsal commences midway between the snout and the base of the caudal fin, which latter has sharp lobes. *Scales,* minute. *Colours,* brownish, becoming lighter on the abdomen; a dark band at the base of the caudal.

Hab.—Doubtful. Two specimens 3 inches long exist in the Calcutta Museum.

36. Nemacheilus butanensis.

Cobitis Butanensis, McClell., C. J. N. H. ii, p. 586.

Nemachilus butanensis, Günther, Catal., vii, p. 358.

B. III. D. 9, V. 7, A. 7.

Length of head 2/11, of caudal 2/11, height of body 1/11 of the total length. *Eyes* small, in the middle of the length of the head. Free portion of tail elongated and compressed, its depth being nearly half of its length. Lips fringed. *Fins,* upper margin of dorsal convex, it commences nearer to the end of the snout than to the root of the caudal, which latter is rounded. The pectoral does not extend half way to the base of the ventral. *Scales,* distinct. *Colours,* doubtful.

Hab.—Bútan, where it attains five inches in length.

37. Nemacheilus rubripinnis.

Cobitis rubripinnis, Jerdon, M. J. L. and S. 1849, p. 332.

Nemacheilus rubripinnis, Day, Fishes of Malabar, p. 203.

B. III. D. 2/8, A. 2/5, C. 18.

Length of head 1/6, of pectoral 1/8, of caudal 1/6, height of body

1/5 of the total length. *Eyes;* diameter 1/6 of length of head, 2 diameters from end of snout and apart. *Fins;* dorsal commences midway between end of snout and base of caudal fin, which is slightly emarginated. *Scales,* minute. *Lateral line,* complete. *Colours,* dirty olive along the back becoming light on the abdomen. Nine bars pass from the back towards the lateral line, and also a number of irregular bands descend to the same distance; a dark bar at the base of the caudal. Dorsal with two bars, the lowest sometimes red. Caudal with three wide bars.

Hab.—Malabar.

38.* Nemacheilus turio.

Cobitis turio, Ham. Buch, Fish. Ganges, pp. 358, 395; *Cuv. and Val., xviii, p. 33.
" *gibbosa,* McClell., Ind. Cyp., pp. 304, 436, pl. 52, fig. 7, (from H. B.'s MS.).
" *arenata,* Val. in Jacq. Voy. Ind. Poiss., pl. 15, fig. 1; Cuv. and Val., xviii, p. 28.
Nemacheilus turio, *Günther, Catal., vii, p. 360.

Turi, Assam.

B. III. D. 8 (10?), P. 12, V. 8, A. 7, C. 19.

Length of head (according to figure) about 1/5, of caudal 1/5, height of body 1/5 of the total length. *Eyes,* of moderate size. Free portion of tail appears higher than long. Back elevated. *Fins;* pectoral nearly reaches the ventral. Caudal emarginate. *Colours;* body irregularly spotted and blotched.

Hab.—Assam.

39.* Nemacheilus guttatus.

Cobitis guttata, McClell., Ind. Cyp., pp. 305, 438, pl. 52, fig. 5, 6; *Cuv. and Val. xviii, p. 79.
**Nemachilus guttatus,* Günther, Catal., vii, p. 360.

B. III. D. 8.

This species is said to have only four barbels. *Colours,* light green with dark blotches.

Hab.—Joorhath in Upper Assam.

Genus. 10. Oreonectes, *Günther.*

Head depressed, body scarcely compressed. No suborbital spine. Six barbels round the upper jaw. Dorsal fin placed far backwards at some distance behind the root of the ventrals; caudal rounded.

Hab.—China.

Genus. 11. Misgurnus, *Lacép.*

Cobitichthys, *Bleeker.*

Body elongated and compressed. No suborbital spine. Ten or twelve barbels, four being on the mandible. Dorsal fin arising opposite the ventrals. Caudal rounded.

Geographical distribution.—This genus which exists in Central and Eastern Europe has also its representatives in India and China.

SYNOPSIS OF SPECIES.

1. *Misgurnus lateralis*, D. 10, A. 8. Barbels ten; body longitudinally banded, ocellus on base of caudal. *Bengal.*
2. „ *anguillicaudatus*, D. 2/7, A. 8. Barbels ten; body irregularly dotted, a black spot on base of caudal. *China. Japan.*

1. MISGURNUS LATERALIS.

Günther, Catal., vii, p. 346.

B. III. D. 10, V. 7, A. 8.

Length of head 1/6, of caudal 1/6, height of body rather less than 1/6 of the length. *Eyes;* diameter 2/9 of length of head, nearly 2 diameters from end of snout. Head and body compressed. *Barbels* ten, the inner mandibular pair very short. Free portion of tail rather longer than deep. *Fins;* dorsal arises midway between end of snout and the root of the caudal, and slightly in advance of the root of the ventral. Pectoral rather longer than the head. Caudal rounded. *Scales,* very distinct. *Colours;* a broad brown band, runs along the middle of the side, and is separated from the brown back by a yellowish band; a narrow and indistinct brown band on the abdomen; a black ocellus edged with white on the base of the upper half of the caudal fin. Dorsal and caudal finely mottled with brown.

Hab.—Bengal from whence one specimen $3\frac{1}{8}$ inches long was received.

2. MISGURNUS ANGUILLICAUDATUS.

Cobitis anguillicaudata, Cantor, Ann. Mag. Nat. Hist., 1842, p. 485; Richard., Voy. Sulph. Fish., p. 143, pl. 55, fig. 9, 10.

Cobitis bifurcata, McClell., C. J. N. Hist., 1844, p. 400, pl 23, fig. 1.

? „ *pectoralis*, McClell., l. c., fig. 3, (Pect. fins elongated).

„ *micropus*, Cuv. and Val., xviii, p. 29.

„ *psammismus*, Richard, Ich. China, p 300.

„ *rubripinnis* et *maculata*, Tomm and Schleg, Fauna Japon, pp. 220, 221, t. 103, fig. 1, 2.

„ *decemcirrhosus*, Basilewsky, Mém, Soc. Nat. Mosc. 1855, p. 239.

? *Cobitichthys enalios*, Bleeker, Act. Soc. Sc. Indo. Neerl., viii, Japan. vi, p. 88, t. 2, fig. 4, (Pectoral fins elongated.)

Misgurnus anguillicaudatus, Günther, Catal., vii, p. 345.

B. III. D. 2/7, P. 9, V. 7, C. 13, L. r. 140, L. tr. 30.

Barbels ten, four being mandibular. *Fins;* origin of dorsal midway between occiput and base of caudal. Pectoral shorter or as long as the head. *Scales,* distinct. *Colours;* body and fins irregularly dotted with brownish black, and generally a small black spot at the upper portion of the root of the caudal fin.

Hab.—China, Japan, Formosa.

(To be continued.)

Monograph of Himalayan, Assamese, Barmese and Cingalese Clausiliæ,—by William T. Blanford, F. G. S., C. M. Z. S., &c.

(With Plate IX.)

[Received 19th January, read 2nd February, 1872.]

Not a single species of *Clausilia* has hitherto been found in India proper, South of the Himalayas, not even in the semi-Malay fauna of the Malabar coast, although one kind occurs in Ceylon.* The few forms hitherto described from the territories belonging to the British Indian Empire are from the mountains to the north, or from the countries to the eastward. Several of those described are rare and local, and some are from places very difficult of access.

By the kindness of my friends, Major Godwin-Austen, Mr. Theobald, Dr. Stoliczka, and Mr. G. Nevill, I have been furnished with specimens of all the species not in my own collection, hitherto described from British Barma, Assam, the Himalayas and Ceylon, except *Clausilia vespa*, Gould, *C. insignis*, Gould, and *C. bulbus*, Benson. I have copied authentic figures of the last two, and I add a representation of a shell from Moulmein which may possibly be a variety of *C. vespa.*

I am unable, without access to a greater number of types, to assign all the Himalayan and Barmese *Clausiliæ* to the proper sub-genera. Those to which the known species hitherto been referred do not always appear to me to include them. Thus *C. insignis*, Gould, *C. Philippiana*, Pfr., and *C. cylindrica*, Gray, have all been classed in *Phædusa*, to which I am inclined to doubt if any except the first really belong. I have classed the species in natural sections, and I have given the most conspicuous characters of each group; and in one case only I have proposed a new sectional or sub-generic name.

Section I.—Shell horny, smooth, elongate; the apical portion deciduous; lunule rudimentary or wanting, palatal plicæ few, the uppermost elongate.

1.† Clausilia cylindrica, Gray.

Pfeiffer, Symbol. III, p. 93. Mon. Hell. II, p. 428;—III, p. 590;—IV, p. 725;—VI, p. 412. Küster, Mart. and Chemn., Pl. XI, f. 12—16. Hanley and Theobald, Conchologia Indica, Pl. XXIV, f. 4.‡

* But a single species *C. Jennaarensis*, Pfr., has hitherto been obtained in the Ethiopian region. The genus is found throughout the temperate portion of the polæarctic region, in the Malay (or Indo-Malay) province, and in part of the neotropical region.

† The figures in Pl. IX correspond in their numbers with the species, thus: 1, *C. cylindrica*, is fig. 1. 2, *C. Iös*, fig. 2, &c.

‡ The full synonomy being given in Pfeiffer's Monograph, I do not repeat it, but only add references to figures.

Hab.—Western Himalayas from the western frontier of Nipál to the Satlej valley, at elevations from 5000 to 9000 feet.

The figure in the *Conchologia Indica* is that of a specimen which, although adult, has retained its apex. This is a very rare occurrence. The figure now given represents the shell as it is usually found.

Three palatal plaits, the upper elongate, are always present, and beneath them there is occasionally to be found a rudimentary lunella. The characters both of the shell and of the internal plication differ widely from those of typical *Phædusa,* in which sub-genus I do not think that the present species can be included. It stands by itself, and I am inclined to look upon it as the type of a peculiar section.

SECTION II.—?*Medora* H. and A. Adams. Shell fusiform, horny, costulate or smooth, apex not deciduous. Lunule developed, with few, usually two, palatal plicæ above it, the upper elongate.

2. CLAUSILIA IÖS, Benson.

Ann. and Mag. Nat. Hist. 1852, Ser. 2, Vol. X, p. 350. Pfeif. Mon. Hel. III, p. 612; —IV, p. 761;—VI, p. 495. Hanley and Theobald, Conch. Ind., Pl. XXIV, fig. 10.

Hab.—Temperate regions of Sikkim and Bútán, in the Eastern Himalayas, from about 5000 to 9000 feet. It doubtless also exists in Nípál. It is generally met with at the roots of oaks and other large trees.

In this species, as was noticed by Mr. Benson, the lunule is sometimes broken up into short oblique plaits above, and consequently the number of palatal plicæ varies. Sometimes there is only the long lamellar plait above the lunule, in other specimens there are, besides the long one, two short plicæ.

3. CLAUSILIA BACILLUM, Benson.

Hanley and Theobald, Conch. Ind. Pl. XXIV, fig. 1, nec Theobald, J. A. S. B., 1858, p. 321.

? *C. ignota,* Theob. J. A. S. B., 1858, Vol. XXVII, p. 321, (descriptio nulla).

Testa subrimata, fusiformis, solidula, glabra, vix striatula, nitidula, superficie sæpe in exemplis veteribus erosa, albido- vel cereo- cornea; spira superne regulariter attenuata; apice obtuso, papillari; sutura simplice impressa.. Anfr. 9 *convexi, ultimus validius striatus, pone aperturam vix compressus; apertura verticalis, piriformi-oblonga, lamella supera validiori, columellari antice vix conspicua, parum torta, intus subfurcata; lunella distincta, plicis palatalibus* 2, *suturæ parallelibus, supera elongata, altera brevi, a lunella vix disjuncta. Peristoma continuum, solutum, album, breviter expansum et incrassatum, margine parietali vix sinuato. Long.* 15, *anfr. penult. diam.* 3·5 *m.m.; apert. cum peristomate* 3·33 *longa,* 2·33 *m.m. lata.*

Hab. in montibus Khasi et Naga dictis, ultra fines meridionales vallis Assamensis. W. Theobald ad Nanclui in montibus Khasi invenit, H. Godwin-Austen haud procul ab Asalu in Cachar septentrionali.

This species is near *C. Iös*, but easily distinguished by the absence of costulate sculpture. I think there can be but little doubt of the identity of the form found by Major Godwin-Austen, from which my figures and description are taken, with the *C. bacillum* of the *Conchologia Indica*, but as only one single figure is given in that work, and there is no description, I may be mistaken. I doubt, however, that this is the *C. bacillum* of Mr. Theobald's paper in the Journal for 1858, l. c., because that was said to be of the type of *C. insignis*, which can scarcely said to be the case with the present species, but as no descriptions were furnished in Mr. Theobald's paper, his names cannot be retained. The name, in the present instance, must be considered as founded on the figure in the *Conchologia Indica*.

4. Clausilia Ceylanica, Bens.

Ann. and Mag. Nat. Hist., February, 1863, Ser. 3, Vol. XI, p. 89.
Pfeiffer, Mon. Hel. VI, p. 427.

Hab.—The mountains in the southern part of Ceylon.

This shell was first found by Mr. Layard, and has since been obtained by Mr. H. Nevill. I am indebted to Messrs. G. Nevill and Stoliczka for the loan of specimens.

Benson, in his original description, has overlooked the lunule, which is well developed, as in the two preceding species.

5. Clausilia Theobaldi, sp. nov.

Testa rimata, fusiformi turrita, cornea, confertim flexuose costulata, translucens. Spira turrita, sensim attenuata, lateribus superne subrectis, apice acutiusculo, sutura impressa. Anfr. 11 *convexi, antepenultimus et penultimus majores, ultimus juxta suturam tumidiusculus, infra plicam palatalem superam compressus, subtus rotundatus. Apertura vix obliqua, piriformis, lamellis approximatis, mediocribus, supera acuta, infera immersa, lunella distincta, plicis palatalibus* 2, *supera elongata, altera brevi. Peristoma rectum, expansum, solutum, margine palatali haud sinuato. Long.* 22 *mm., diam.* 3·5 ; *apert.* 3·5 *mm., longa,* 2· 6 *lata.*

Hab.—Tonghu in provincia Barmana. Detexit W. Theobald.

This is the only species of the present group hitherto found in Barma.

Section III.—*Phædusa*, H. and A. Adams. Shell fusiform, generally rather thick; apex not deciduous. No lunule, palatal plicæ numerous, the uppermost produced nearly to the aperture.

A. *Sutures crenulated.*

6. Clausilia loxostoma, Bens.

J. A. S. B., 1836, Vol. V, p. 353. Pfeiffer, Mon. Hel. II, p. 404;—III, p. 590;—IV, p. 725;—VI, p. 411. Hanley and Theobald, Conch. Ind. Pl. XXIV, fig. 7.

C. Bengalensis, Von dem Busch, Pfeiffer, Symb. II. p. 60.—Küster, Mart. and Chem. p. 24, pl. 2, fig. 11-13.

Hab.—Khasi hills, North-east of Bengal, and South of the Assam valley.

The locality usually assigned to this shell, Bengal, conveys a false impression, as neither this nor any other *Clausilia* is found in the plains of India. Teria ghat, the locality mentioned in the *Conchologia Indica*, is at the southern base of the Khasi hills, and the shell is found at many places along the range, from the base up to a height of, I believe, 4000 or 5000 feet. Major Godwin-Austen sent me this species from Habiang on the Khasi plateau. I do not know if *C. loxostoma* occurs also on the northern or Assam flank of the range; I have never seen specimens from any place in that direction, and as the climate is much drier, many of the shells common on the southern watershed are wanting to the north.

The form of this species varies considerably, some specimens being much more fusiform than others. I have figured three varieties, of which figure 6 may be considered as the typical form.

7. Clausilia ferruginea, sp. nov.

Testa subrimata, elongato-fusiformis, solida, fere glabra, striatula, haud nitida, sordide et interdum pallide ferruginea; spira alta, lateribus sursum subrectis, apice obtuso papillari, sutura impressa, valde crenulata. Anfr. 11 *convexi, ultimus capillaceo-striatus, basi rotundatus. Apertura fere verticalis, subtrapezoidalis, marginibus lateralibus fere parallelis, basali rotundato; lamella supera acuta, sinistrorsim inflexa, columellari mediocri, plicis palatalibus circa* 5, *supera elongata, haud procul ab apertura desinente, suturæ parallela, cæteris magis obliquis curvatisque. Peristoma continuum, album, expansum, parum incrassatum, margine supero repando, leviter sinuato. Long.* 30, *diam.* 5·5 *mm.; apert. cum perist.* 6·5 *longa,* 4·66 *lata.*

Hab.—*In montibus* Naga *dictis, ultra fines meridionales provinciæ* Assam, (ditexit Masters).

7a. Var. tumida, anfractibus ultimis aperturaque majoribus. Long. circa 33, *diam.* 6·5 *mm., apert.* 7 *longa,* 5 *lata.*

Hab.—*In* "North Cachar," (Godwin-Austen).

This fine species, the largest hitherto found in Assam or the Himalayas, resembles *C. loxostoma* in its strongly crenulated sutures and in form, but differs in its larger size and more numerous whorls. It was first found by Mr. Masters in 1860, in the hills south of Golaghát, together with *Spiraculum Mastersi* and other interesting shells. The more tumid variety has lately been obtained in North Cachar by Major Godwin-Austen.

8. Clausilia Asaluensis, Godwin-Austen, MS.

Testa non rimata, fusiformi-turrita, alba vel pallide castanea, solidula, striata, ad anfractus duos ultimos capillaceo-striata. Spira sensim attenuata lateribus superne concaviusculis, apice obtusiusculo, sutura impressa, confertim

minuteque crenulata. Anfr. 12-13, *convexi, antepenultimus maximus, penultimus parum minor, ultimus ad latus compressus, ad basin rotundatus. Apertura subverticalis, piriformis, lamella supera compressa, columellari immersa, lunella nulla, plica palatali supera elongata, suturæ parallela, secunda etiam parallela, mediocri, cæteris obliquis. Peristoma leviter sinuatum, album, incrassatum, continuum, breviter solutum. Long.* 23·5, *diam.* 5 *mm.; apert. c. perist.* 5 *longa,* 3·66 *lata.*

Hab. ad Asalu in North Cachar, *ad altitudinem* 7000 *ped. angl.* (Godwin-Austen.)

This species is easily distinguished from both *C. loxostoma* and *C. ferruginea* by its more numerous whorls and finely crenulate sutures. In size it is intermediate between the two, some specimens being as much as 26 mm., or rather more than an inch in length.

B. *Sutures simple.*

9. Clausilia fusiformis, W. Blanf.

J. A. S. B., 1865, Vol. XXXIV, Pt. 2, p. 80. Pfeiffer, Mon. Hel. Vol. VI, p. 410. Hanley and Theobald, Conch. Ind. Pl. XXIV, fig. 6.

Hab.—Arakan hills, Barma.

This shell was described from a single immature specimen. Mr. Theobald has since found several adult shells from one of which the figure now given is taken. These differ a little from the type, they are smaller, and the lower whorls are rather more convex. The peristome is thickened, expanded and continuous. The following are the characters of the form now figured.

Testa non rimata, fusiformis, albo-cornea, minute oblique præsertim ad anfractum ultimum costulato striata; spira supra anfr. antepenultimum lente decrescente, versus apicem acutiusculum rapide attenuata; sutura simplice parum impressa, versus apicem profundiore. Anfr. 8-9, *superi convexi, cæteri convexiusculi, antepenultimus tumidus, penultimus minor, ultimus ad basin rotundatus. Apertura rotundato-piriformis, parum obliqua, lamella supera mediocri, infera paulum immersa torta; lunella nulla, plica palatali supera longissima, cæteris brevioribus subparallelis, vix obliquis. Peristoma album, incrassatum, expansum, continuum, non solutum, leviter sinuatum. Long.* 22·5, *diam.* 6 *mm. Apert. c. perist.* 6 *mm. longa,* 5 *lata.*

This species closely resembles the next, but appears to be distinguished by having 1 to 2 whorls less, by the apex being less attenuate, and the lower palatal plaits much less oblique. It is quite possible, however, that connecting links may be found, in which case I should be inclined to unite the two.

10. Clausilia Gouldiana, Pfr.

Malakoz. Blätter, 1856, Vol. III, p. 259.—Mon. Hel. IV, p. 724,—VI, p. 409.—Nov. Conch. I, p. 123, Pl. XXXIV, fig. 18—20.

Hab.—Mergui and Moulmain, Tenasserim provinces, British Barma.

This species was first described by Pfeiffer from Mergui specimens in Mr. Hugh Cuming's collection. It has since been found abundantly by Mr. Theobald near Moulmain. It varies much in colour, some specimens being brown, others rosy pink, others nearly white; the peristome is either pink or white. Some shells from Moulmain are only 22 millemetres long, others are nearly 26.

11. CLAUSILIA INSIGNIS, Gould.

Proc. Bost. Soc. Nat. Hist. Vol. I, p. 140.—Bost. Jour. Nat. Hist. Vol. IV, p. 458, pl. XXIV, fig. 8. Pfeiffer, Mon. Hel. II, p. 423.

Hab.—Tavoy, Tenaserim provinces, Barma.

The figure given is copied from Gould's. I have never seen this species.

12. CLAUSILIA SP.

C. insignis, Pfr. (nec Gould), Mon. Hel III, p. 589 —IV, p. 725.—VI, p. 409.— Nov. Conch. I, p. 122, Pl. XXXIV, fig. 15—17.

C. insignis, Hanley and Theobald, Conch. Ind. Pl. XXIV, fig. 2.

Hab.—Tenaserim provinces. *Var. gracilior*, Conch. Ind. Pl. XXIV, fig. 3, is from Moulmain.

The figure now given is copied from that in the *Conchologia Indica*, but reduced to the natural size.

It appears to me evident, either that Gould's figure of *C. insignis* in the Boston Journal is incorrect, or that a different shell has been figured under the same name by Pfeiffer and Hanley. The first is improbable, because the other shells represented on the same plate are excellently figured, and I can only conclude that two forms have been confounded under this name. The *C. insignis* of Pfeiffer and Hanley requires naming, but as I have no specimens, and the system of giving names to figures is highly objectionable, I shall not attempt to supply the deficiency.

The *C. insignis, var. gracilior* of the *Conchologia Indica* is probably a variety of the present form. From the references given in the *Conchologia* I am inclined to believe that Mr. Hanley has already noticed the differences between Gould's and Pfeiffer's shells described as *C. insignis*, and that he believes the former to be represented by fig. 2, the latter (his *var. gracilior*) by fig. 3, of Pl. XXIV, of the *Conchologia*. It appears to me, however, that Pfeiffer's figure in the *Novitates Conchologicæ* agrees far better with fig. 2, than with fig. 3, and that Gould's original figure in the Boston Journal represents a shell quite distinct from both.

13. CLAUSILIA MONTICOLA, Godwin-Austen. MS.

Testa rimata, exilis, elongata, fusiformi-subulata, solidula, brunnea vel brunnescente-grisea, striata, parum nitida; superficie sæpe erosa; spiræ lateribus antice rectis, apicem papillarem versus concaviusculis; sutura simplice, impressa. Anfr. 13 *convexi, primi* 4 *fere cylindrici, antepenultimus*

vix quam penultimus major, ultimus ad basin rotundatus, haud compressus. Apertura piriformis, fere verticalis, lamella palatali sinistrorsim deflexa, acuta; columellari subprofunda; lunella nulla, plicis palatalibus fere parallelis 6-7, *supera valde elongata. Peristoma continuum, vix solutum, leviter sinuatum, superne repandum, expansiusculum, mediocriter incrassatum, album, margine parietali leviter sinuato. Long.* 21, *diam. anfr. penult.* 4 *mm.; apert. cum perist.* 3·66 *longa,* 2·66 *lata.*

Hab.—In montibus Burrail dictis, ad latus meridionale vallis Assamensis, in "North Cachar," *ad alt. circa* 6500 *ped. angl. detexit* H. H. Godwin-Austen.

This species is well distinguished from its allies by its slender shape and numerous whorls.

I have a single specimen of a *Clausilia* from the Arakan hills, somewhat similar to *C. monticola,* but with only ten whorls. As it is bleached and the surface in bad condition, I do not desribe it.

Section IV.—*Oospira,* sect. nov.* Shell with but few whorls, usually five or six, and of a peculiar more or less oval form with a very blunt apex. Lunule wanting, palatal plaits as in *Phædusa.* Type *C. Philippiana,* Pfr.

The known shells of this section are solid deeply coloured *Clausiliæ,* smooth or with very slight sculpture. So far as is hitherto known, the type is peculiar to Martaban and Tenasserim.

14. Clausilia Philippiana, Pfr.

Zeitschr. f. Malak. 1847, p. 69.—Mon. Hel. II, p. 423;—III, p. 590;—IV, p. 725;—VI, p. 401, Küster, Mart. and Chem. p. 100, Pl XI, fig 7—9. Stoliczka, J. A. S. B; 1871, Vol. XL, Pt. II, p. 174, Pl. VI, fig. 7—10 (lingual teeth, jaw and anatomy).

Hab.—Moulmain. According to Pfeiffer this shell is also found at Mergui, but I have never seen specimens from the latter locality.

15. Clausilia vespa, Gould.

Proc. Boston Soc. 1859, Vol. VI, p. 12.—Otia Conchologica, p. 220. Pfeiffer, Mon. Hel. VI, p. 409.

Hab.—Tavoy (and Moulmain ?).

I have figured a shell from Moulmain which may possibly be this form, as it agrees in its measurements with Gould's type; but it is barely separable from *C. Philippiana.* Gould's description is so meagre that, it is very difficult to identify the species, and it has never, so far as I am aware, been figured.

The shell here represented has a most astonishing resemblance to *Clausilia Bartletti,* H. Adams, Proc. Zool. Soc. 1866, p. 441, Pl. XXXVIII, fig. 2, from Peru. We shall presently see that this is not the only instance of resemblance between Barmese and South American *Clausiliæ.*

* Etym. ωον an egg and σπειρα a spiral.

16. Clausilia bulbus, Bens.

Ann. and Mag. Nat. Hist. 1863, Ser. 3, Vol. XI, p. 321. Pfeiffer, Mon. Hel. VI, p. 409. Hanley and Theobald, Conch. Ind. Pl. XXIV, fig. 5.

Hab.—Banks of the river Attaran, near Moulmain. I have never seen this species. The figure in the *Conchologia Indica* is, I believe, taken from Mr. Benson's original specimen; I have therefore given a copy reduced to the natural size.

17. Clausilia ovata, sp. nov.

Testa vix subrimata, elongato-ovata, pupiformis, intense rufo-ferruginea, regulariter confertimque striata; spira tumida, apice convexo, sutura parum impressa. Anfr. 5·5 *convexiusculi, primi rapide accrescentes, antepenultimus maximus, penultimus vix minor, ultimus ad basin rotundatus. Apertura auriformis, fere verticalis, juxta anfractum penultimum repanda, lamella supera acuta, antice validiore, fere verticali, infera stricta; lunella nulla, plicis palatalibus* 7, *supera producta, in fauce aperturæ conspicua, suturæ parallela, secunda curvata, cæteris brevibus obliquis. Long.* 19, *diam.* 7 *mm. Apert. oblique* 6 *longa,* 4·5 *lata.*

Hab. Ad Nattoung, juxta ripam Attaran fluminis, haud procul a Moulmain in Barma.

This is a fourth species of this little group. It is more ovate than *C. Philippiana* and *C. vespa*, smaller and less tumid than *C. bulbus.*

Section V.—*? Nenia* H. and A. Adams. Shell elongate, mouth entirely free from the last whorl, and broadly expanded, both the lamellæ of the aperture on the parietal margin and close together, subcolumellar lamina large and not concealed by the columellar, a large lunule and one or two parietal plaits above it.

This group includes one species from British Barma, and one (*C. tuba** Hanley) from the Shan States of Upper Barma, outside of the British territories. It appears to differ from the South American forms which compose the subgenus *Nenia* in the possession of a lunule, but I have no sufficient means of comparison, and in other respects some of the Neotropical forms closely resemble those of Barma.

18. Clausilia Masoni, Theob.

J. A. S. B., 1864, Vol. XXXIII, p. 246, Hanley and Theobald, Conch. Ind. Pl. XXIV, fig. 8.

Hab.—Near Tonghú in the mountains between Pegu and Martaban.

The lamellæ of the aperture are as above described. Those of *C. tuba* are precisely similar.

* Ann. and Mag. Nat. Hist. May, 1868, Ser. 4, ol. I, p. 343. By mistake, in the *Conchologia Indica*, the Proceedings of the Zoological Society are quoted as the work in which this species was described.

Postscript to the Monograph of Himalayan and Barmese Clausiliæ,—*by* Dr. F. Stoliczka.

(Received 31st July, 1872.)

(See plate IX.)

In looking through the proof-sheets of Mr. Blanford's paper, while they passed through the press, and comparing his descriptions with the specimens of Indian and Barmese *Clausiliæ* in my collection, I find that a few additions can be made to the Monograph. The new species are figured on the same plate, IX. I would have gladly handed over the additional materials to Mr. Blanford, but as he is now engaged on an expedition in Persia, and may not for some time return to Calcutta, I do not think it advisable to defer on that account the publication of these notes.

I have only to observe that I had an opportunity of comparing some of Mr. Theobald's original specimens, and have thus been enabled to add some information regarding the synonymy of one or two doubtful species.

1. Cl. cylindrica. (Ad p. 199.)

I have specimens of this species from near Tézpúr (Asám), and Dr. Waagen very recently brought one from near Marri; the geographical distribution of the species may, therefore, be said to extend over the whole of the southern slopes of the Himalayas, though its head-quarter appears to be about Nyni-tál, or near the centre of the range.

3. Cl. bacillum. (Ad p. 200.)

This species varies considerably both in the form and length of the shell. The specimen figured may be taken as the type, but others longer and slenderer are quite as common, they very closely resemble *Theobaldi* in form, differing from it by their smooth shining surface. One of the most slender specimens measures: total length 15, thickness 3 mm.; it has 10½ whorls and is much attenuated towards the apex.

The representation in the 'Conch. Indica' must evidently be taken as that of true *bacillum*, of which, the authors of that work say, two specimens were known at that time: one in Benson's and the other in Theobald's collection. These are the two specimens to which Theobald (Journ. A. S. B., 1858, p. 321) refers under the name of *ignota*, as a provisional name, while the single specimen which he quotes l. c. as '*C. Bacillun*, B.' is a somewhat worn *Cl. Asaluensis*, and hence Theobald's reference that the species is of the type of *C. insignis*. I have carefully examined with Mr. Theobald his type specimens, and the question as regard the synonymy may be considered as settled; the species must stand as recorded by Blanford.

6. Cl. loxostoma. (Ad p. 202.)

The typical specimens of this species are pale brownish or dull ferruginous, and nearly smooth or obsoletely striated. Together with these a white, solid variety occurs on the Khasi hills; in form it tolerably agrees with Blanford's fig. 6*b* (plate IX), some specimens are, however, still a little thicker, and the transverse costulation on all the whorls is very distinct, while the crenulation along the suture is generally not so coarse, as in typical *loxostoma*, though evidently stronger than in *Asaluensis*, which latter also differs by a more slender shape and smaller aperture. Although the above noticed form appears to be a well marked variety of *loxostoma*, the differences do not seem to be constant, and both shells unquestionably are of the same type. The crenulation on the two last whorls is often most regular, each alternate rib somewhat projecting into the sutural impression. In other specimens two ribs unite to a sutural tooth. The stronger or finer costulation, or striation, of the whorls appears to depend upon the character of the locality in which the specimens live.

I have added a figure (6*d*) of one of the shortest costulated varieties from the Khasi hills.

10. Cl. Gouldiana. (Ad p. 203.)

This also is one of the most variable species, both in colour and form. Young specimens are either brown or of a beautiful rosy tinge; older shells, after they become solidified, either retain the brown or pink colour, or the lip becomes yellowish brown or perfectly white; the 3-5 top-whorls are always white. The form differs from fusiform to highly turreted, as may be indicated by the following measurements—

a.	long	23,	lat.	6,	long. apert.	5·2,	ej.	lat.	4·2	mm.
b.	,,	28,	,,	6·3,	,, ,,	6·2,	,,	,,	5·	,, ,,
c.	,,	32,	,,	6·5,	,, ,,	6·	,,	,,	5.	,, ,,

All three specimens are from near Moulmain; *a* is almost exactly identical with Pfeiffer's original figure of the species; *b* and *c* are a white and a yellowish liped variety from Mr. Theobald's collection; *c* has an almost abnormally small aperture as compared with the length of the shell.

11 and 12. Cl. insignis. (See also fig. 12*a*; ad p. 204).

Mr. Blanford is of opinion that Pfeiffer's *insignis* is not the same as Gould's, but that it is identical with the form figured by Hanley and Theobald in the Conch. Iconica.

There is undoubtedly a slight discrepancy between Gould's original figure and description. He states the number of whorls to be 8 or 9, and the apex 'mamillated,' while the figure shews it shortly pointed; then again he gives 'length 1 inch, breadth ¼ of an inch.' The original figure (whether enlarged or not, it is not stated) represents a shell of 28 mm. in length and 7 in thickness; the second dimension is, therefore, only one fourth of the total

length, instead of one fifth; if the latter were the case, the shell would be an extremely slender one, and comparing it with *Gouldiana*, as a shell of the same type, I would prefer to consider Gould's figure as more probably correct, than his measurement. Now, allowing for these discrepancies in Gould's original statements, I am inclined to think that Pfeiffer's species is very closely allied to, if not exactly identical with, true *insignis*, but Hanley and Theobald's figures certainly seem to be somewhat different from both the preceding; however, they do not exclude the possibility of representing mere variations of one and the same species. Whether the form of the aperture in Gould's original figure is slightly exaggerated or not, I think the great expansion of the outer lip is decidedly somewhat abnormal, and setting aside this point the remaining differences between the shells figured as *insignis* are not greater than those between the different varieties of *loxostoma* or *Gouldiana*.

In order to clear up the matter more easily I add here (fig 12*a*) a copy of Pfeiffer's figure of *insignis*. I greatly regret that I have not got the opportunity of examining Mr. Theobald's two type specimens, figured in the Conchologia Indica as '*insignis*' and var. *gracilior*, but possibly I may be in a position to supply the deficiency in the next number of the Journal.

15. Cl. vespa. (Ad p. 205.)

The shell delineated by Mr. Blanford as a variety of *vespa* may be considered as a fair representation of that species; but I add a figure (15*a*) and description of a specimen obtained by Mr. Theobald at Tavoy, whence *vespa* was originally got, and which is undoubtedly Gould's species.

(15*a*). *Cl. testa ovato-cylindracea, ad apicem obtusiuscula, albida, medio subinflata, ultimo anfractu sensim attenuata, haud rimata, fusco castanea; anfractibus sex, convexiusculis, sutura simplici junctis, transversim oblique et confertissime striolatis; apertura subovata, postice rotundate subangulata, antice late sub-effusa, intus violaceo rufa, peritremate modice expanso, interno oblique fere recto, libero, biplicato; plica antica, vel inferiore, valde obliqua, sub-immersa; plicis palatalibus novem tenuibus, supera longissima, circiter* 1·2 *m.m. a margine suturali distante, alteris brevioribus et inter se valde inæqualibus.*

Long. 24.6 *m.m., lat.* 7; *long. apert. cum perist.* 6·3, *ejusdem lat.* 4·8 *m.m*

Although allied to *Phillippiana* the present form is undoubtedly quite distinct, differing from Pfeiffer's species by a more slender shape, smaller aperture, free inner lip, peculiarly flattened or almost canaliculated aperture on the anterior end, and by the larger number of palatal plicæ.

19. Clausilia Waageni, n. sp.

Cl. testa conoideo-turrita, corneo-fusca, apice obtusiuscula, sub-rimata anfractibus 11, *paulo convexis, sutura simplici junctis, lateraliter api-*

cem versus paululum concava ; omminis transversim oblique confertim constulato-striatis, ultimo antecedente vix latiore, prope aperturam costulato, basi paulum contracto, convexiusculo ; apertura verticali, postice (vel supra) angulata ; peritremate modice incrassato, vix expanso, albescente, antice recedente, interno soluto, antice rectiusculo, biplicato, plica postica (aut superiore) brevi, altera vix conspicua ; lunella distincta, plica longa, tenuissima superposita, altera brevi, a terminatione supera lunellæ haud separata.

Long. tota 18, *diam.* 4 ; *long. apert. obliq.* 4, *ejusdem lat.* 2·7 *m. m.*

Hab.—Changligalli, prope Marri, Himalaya occident., ad altitudinem circa 9000 *ped. angl. detexit W. Waagen.*

This is the most westerly known species of the genus in India. A single, but perfect, specimen was found by Dr. W. Waagen, together with *Cl. cylindrica*, under the bark of an old tree at the above mentioned locality. The nearest allied species is *Cl. Iös*, but the larger size of the shell, comparative shortness of the two last whorls, larger and more straight aperture readily distinguish this new form.

20. Cl. Arakana, Theob. (M.S.)

Cl. testa stramineo-albida, subfusiforme-turrita, apice attenuata, aperturam versus subangustata, non rimata ; anfractibus 10-12, *paulum convexiusculis, sutura profunda simplici junctis, transversim oblique capillaceo striolatis ; apertura rectiuscula, sub-rectangulari, antice subrotundata, marginibus modice dilatatis et incrassatis, labio breviter libero, fere recto, biplicato, plica antica (seu inferiore) valde oblique intrante ; plicis palatalibus quinque, fere æquidistantibus et inter se parallelis, supera longissima, cæteris subæqualibus.*

Long. 17—20 ; *lat.* 3·8-4 ; *long. apert.* 4-4·4, *lat.* 3-3·2 *m.m.*

Hab.—In montibus Arakanensis et ad Mai-i in provincia Sandoway dicta detexit W. Theobald.

This is the new Arakan species to which Mr. Blanford alludes at p. 205, when speaking of *Cl. monticola ;* it differs from this last by its more fusiform instead of conoidally turreted shape, its thinner texture, larger aperture and somewhat differently arranged palatal folds. I have given illustrations of a shorter form with ten whorls and of another with twelve whorls, the former is a single specimen from the hills S. E. of Akyab, the other was collected by Mr. Theobald at Mai-i in the Sandoway district. These two forms represent the extreme variations which were noticed among a large number of specimens.

Notice of the Mammals and Birds inhabiting Kachh,—*by* Dr. F. Stoliczka.

[Received 28th May, read 3rd July, 1872.]

The study of local faunas must, for some time at least, continue one of the most important means of leading to a full understanding of Indian Zoology. India combines such an enormous variety of physical conditions, namely, differences in level, climate and vegetation, all of which have to be studied in connection with the animal life, that one is almost lost in the chaos of information required, and is very apt to overlook conditions, which may be essential for the explanation not only of peculiarities as regards distinctions of species, but also of those relating to geographical distribution.

Researches limited to single districts are not necessarily liable to these disadvantages, because they can more easily command the smaller amount of observations, and obtain an acquaintance with the physical conditions which may lead to their explanation.

It is with this view that I have ventured to place on record what little I observed of the Zoology of Kachh. I scarcely need to add that I greatly regret the incompleteness of the lists, but as the duties of the geologist are entirely different from those of a zoologist, he can hardly pretend to give satisfaction to both. During my rather hurried visit, my attention was chiefly directed towards the Vertebrata,* and in this branch I attempted to

* Invertebrata are also by comparatively small numbers represented, as may be indicated by the following notice:

Of Crustacea I have obtained only two species in the streams, a small *Palæmon* which is tolerably common, and a *Chirocephalus* (= *Branchipus*, apud Milne-Edwards); the latter only occurred in a slightly brackish stream west of Bhúj. Mr. Wood-Mason who examined the two species tells me that the latter presents a remarkable modification of the antennæ.—The Arachnoids, which were specially looked after, did not yield more than twenty species, chiefly of the families *Epeiridæ* and *Lycosidæ*, and a few *Salticidæ*. Of *Scorpions* I got four species; *Scolopendræ* three; *Juli* two or three. The *Coleoptera* commonly seen mostly belong to the *Blapsidæ*, which form an important article of food to the hedgehog; *Scarabæidæ* and *Carabidæ* are comparatively few, and still rarer other kind of beetles. Butterflies, on account of the almost constant strong winds, are very rarely seen, indeed with the exception of a few small *Pieridæ* and *Lycænidæ*, and a number of Microlepidoptera, I have scarcely seen any other species. The *Hymenoptera* are mostly represented by *Ichneumonidæ*. Ants are a real pest in houses and in the camp, in spite of the dryness of the climate. Of *Rhynchota* my collection barely contains a dozen species, including the *Nepæ* and *Cicadæ*, but they must be more numerous during the wet season. Of *Libellulidæ* I obtained about ten species, and not many more are, I think, procurable in winter. *Blattidæ* I have seen three, the most common is *Periplaneta germanica*. Of *Acrididæ* &c., about a dozen or more species occurred.

note down and to collect what was possible, without interfering with my other more important work. The list of the mammals and birds will be given in the following pages; on the reptiles and amphibians I have already reported, (see Proc. A. S. B., for May, 1872, p. 71); and the examination of the fishes was kindly undertaken by Surgeon Major Day, whose paper on the subject follows the present one.

However, before entering upon any details, it will be probably desirable to say a few words regarding the principal physical features of the country, particularly in connection with the mammals and birds to be met with; only adding here that my remarks solely apply to the aspect of the country during the cold and dry season between November and February.

The province of Kachh extends for about 150 miles along the Tropic of Cancer, having a breadth of about 40 miles on either side of it, and the Meridian of 70° eastern longitude passes through it a little eastward of the centre. The main land stretches along the seacoast from the most eastern branch of the Indus to Káthivár, from which it is separated by the Gulf of Kachh; to the North and East it is entirely isolated from Sind and the eastern Rajpútána states by the so-called Ran, which was no doubt formerly an arm of the sea, but is now very much silted in. It has a varied breadth from 40 to nearly 100 miles. During the dry and hot weather some portions of it are under water and others are so thickly covered with a saline deposit, or almost pure salt, that the ground becomes unfit for the support of animal life. A wild ass may be seen in the distance, or a desert-lark (*Certhilauda desertorum*) running along the trodden track, but scarcely any other animal exists, unless a bird may accidentally migrate from one place to another. During the rainy season by far the greatest portion of the Ran is inundated, and a good number of the larger water birds are said to be seen on it. The slightly elevated ground, which locally forms strips in the Ran proper, supports a very scanty vegetation of rough grasses (*Cyperaceæ*), and of a few scattered bushes of tamarisk &c.; this part is called the Buni and, if the monsoons are not heavy, it affords rich pasture for cattle during that time, but in the dry season even the nomadic Sindees are often obliged to

Of freshwater shells which, however, also occur in slightly brackish streams, I met with the following: *Planorbis exustus*; *Plan. n. sp.*, allied to *Cantoris*; *Lymnæa luteola* and *amygdalus*, the latter closely allied to *acuminata*; *Paludina dissimilis*, (*melanastoma*) exactly identical with South Indian and Ceylon specimens; *Bythinia pulchella* and two other species of the same genus; *Melania tuberculata*; *Unio cæruleus* and *leioma*; and a small *Corbicula*, apparently very rare.

Of landshells I found *Bulimus insularis*, *B. abbysinicus*, *B. punctatus*, *B. cœnopictus* and two other *Bulimi*, allied to the last, one slightly and the other very much, thinner, almost cylindrical; *Ennea bicolor* (cylindrical and perfectly smooth variety); *Stenogyra gracilis*; *Helix fallaciosa* and *Tranquebarica*, *Macrochlamys pedinus*, *Succinea vitrea* and *crassiuscula*. With the exception of *Bul. insularis* none of the shells is common.

leave it for want of water. Wherever intercalations of clayey beds between sandy layers make a slight accumulation of fresh water possible, Kunda-treelets (*Prosopis*) grow rather abundantly and form little forests, sometimes of one or two miles in length, but generally very narrow in breadth. However, little life animates these isolated tracts.

Among the Kunda *Sylvia curruca*, *Phylloscopus tristis*, *Lanius lahtora* and *vittatus*, *Saxicola desertorum* (= *atrogularis*), *Turtur Cambayensis*, *Upupa Ceylonensis*, *Athene brama* and perhaps a few of the smaller hawks, and the ubiquitous *Sciurus palmarum* are almost all the birds and mammals to be observed, in addition to the usual camp followers, kites, crows, pigeons, &c. The herds of cattle and sheep are invariably accompanied by *Dicrurus albirictus*, and wolves, hyænæ, and generally also a leopard are not far off. On the woodless portions of the Buni, almost the only birds to be seen are *Spizalauda deva*, *Alauda triborhyncha*, *Pterocles exustus*, *Cursorius Jamesoni* (= ? *gallicus*), *Chettusia gregaria*, and one or two others of the cursorial tribe.

The little islands in the Ran, called Beyts, are nearly quite uninhabited, and on the slightly larger ones a harrier and a stonechat (*Circus Swainsoni* and *Saxicola picata*), or perhaps locally a stray dove, the pursuer and the pursued are all that an ordinary observer would notice of animal life.

The more elevated ground can be physically divided into three, (or perhaps four) nearly parallel ranges, extending almost due east and west. Each of these ranges has an abrupt declivity on the northern and a very gradual slope on the southern side. Thus the greatest elevation in each range lies near the northern edge, where precipitous cliffs and moderately hilly tracts occur; but as the greatest height of any of the hills in Kachh does not exceed 1500 feet, and as the entire breadth of the hilly portions is rarely more than three or four miles, they are not capable of producing any essential effect upon, or change in, the general climatal conditions. The hills are as a rule only thinly covered with brushwood, mostly consisting of leafless and thorny bushes, and oftener they are almost entirely bare.

The first of the ranges occupies Pacham, Karir, Bela and a few adjoining small islands in the Ran; their northern declivities are for want of water entirely uninhabited, but each has a long and gradual, though very thinly populated, slope to the south. On the eastern and western sides, the ridge rather abruptly disappears under the Ran, to the south the slope gradually passes into the Buni, and Bela is scarcely separated from Wagur, which is the most eastern district, moderately but very irregularly hilly, composed of short ranges and a few isolated basalt hills; and towards the west connected by low, mostly cultivated, ground with Kachh proper. The second (the Jora-Hulaman) range stretches along the northern edge, and the third, the Charvar

and Katrol range, nearly through the centre of the mainland of Kachh. These two ranges more gradually decrease in height towards their ends and join each other near the western extremities, but diverge on the eastern side, the former passing in its prolongation through Wagur. The fourth range is the lowest, lying south only a short distance from the Charvár-Katrol range, and is sometimes not very distinctly separated from it; it entirely consists of basaltic trap and is locally rather thickly covered with bushes and Kunda.

As the configuration of the ground very much depends upon its lithological structure, I may notice that sandy or shaley limestones only occur in the axes of the first and second ranges, but far more prevalent are sandstones and shales. Solid basalt and quartzitic rocks occur in isolated hills, or in dykes, and there are also a few shorter and longer ridges consisting of varied trap-rocks which easily break up in fragments and, if any moisture exists, readily decompose. Decomposition goes on, however, at a much more rapid pace in the softer rocks, namely, the sandy limestones, sandstones and shales. It is indeed often not easy to meet for days with a rock, that would not crumble almost under the fingers, unless it be accidentally hardened, by a neighbouring basalt dyke, or some other causes producing dislocations of strata, &c.

On account of this rapidity with which the disintegration of the rocks has been going on from time immemorial, all the depressions between the hills, the ravines and river courses, had been deeply filled up with sand, which with equal facility also spread into the longitudinal valleys separating the principal ranges. Thus instead of fertile valleys, we meet with extensive sandy plains, which are capable of supporting only a very scanty vegetation, and the monotony of which is merely interrupted by an isolated basalt hill, or a trap or quartz dyke of a few miles in length. There exists some geological evidence which indicates, that at least along the northern precipitous slopes of the ranges locally a very large accumulation of water had taken place in comparatively recent geological time, and then moisture, vegetation and animal life might no doubt have in equal proportion been greater and more prosperous. It was probably also at that somewhat remote time, when the great and deep ravines had locally been cut, the existence of which, with the present comparatively insignificant water supply, it is almost impossible to explain. But now the fine water sheets have given way to desert ground, on which the sand is shifted about at the will of the agitated atmosphere.

The prevailing, and usually heavy, winds within the greater part of the year, appear to come from South-West or West, although during the cold season North-east winds are by no means uncommon. But instead of bringing any moisture from the sea side, they seem to take away the little which exists. The ground is so dreadfully heated under the powerful glare of a rarely covered sky, that it seems entirely to prevent even the approach of

moisture, unless the atmosphere be near the point of saturation; and this seems indeed to be of very rare occurrence.

Mr. Wynne, in whose Memoir on the Geology of Kachh* the physical geography of the province is briefly referred to, states that the average rainfall for the last twenty-one years up to 1869 was only 14·3 inches; within the three past years the annual fall scarcely exceeded ten inches. Some tracts of the country had actually barely a drop of rain during the whole year, and these had to be deserted during the dry season by the inhabitants, who generally on such occasions betake themselves with their cattle to Sind, returning to their homes during the following rainy season.

This state of affairs is not in any way mitigated by a marked change in the general temperature of the air. Ice is apparently quite unknown in Kachh. On very cold mornings in December and January, I occasionally saw the thermometer as low as 35,° but it never sank to freezing point, and that comparatively low temperature was observed only along the Ran, where the wind blowing across the wet Ran was cooled down. Even in those two months the thermometer was rarely under 80° or 90° after midday in the shade, and in February, it generally rose to about 100.° In the sun I have not seen it a single day under 100 degrees.

In consequence of this scarcity of rain, on account of the great heat, and further on account of the abundance of superficial sandy deposits, large rivers are entirely unknown, at least during the greater part of the year. The little water, which is supplied by a few springs in the hills, is generally lost in the sand before it reaches the desert plain, or it accumulates into small pools and hollows in suitable places, where clayey beds retard or stop the percolation through the sand. But in slowly passing through the sand, the water becomes more or less saturated with various salts, the consequence being that, if any running water at all is to be met with in a stream, it is in nine cases out of ten brackish,—not wholesome for beasts and deadly for men. But even in the wells, which the people sink for purposes of raising water for irrigation, this is often brackish, and it is sometimes with the greatest difficulty that perfectly fresh water can at all be obtained near a village. The simple recollection of the foul and dirty fluid, that one is occasionally obliged to accept in order to quench his thirst, is enough to make one shudder.

All these elements of physical condition, to which I have briefly referred, tend towards making the country a *terra hospitibus ferox*, an expression often repeated for want of a more suitable one, or, as an early traveller expressed himself, a country fit only for a geologist to travel in. The general result of those unfavourable physical conditions is, that we have before us a few ranges of low hills of 80 or 100 miles in length, varying in height from

* Mem. Geol. Survey of India, vol. IX, p. 12 et seq.

about 300 to 1400 feet, either bare, or covered with scanty grass or low thorny bushes, and intersected by dry ravines filled with debris and sand. Except along their edges these hilly tracts are scarcely at all inhabited. The depressions separating the longitudinal ranges more resemble in the average time of the year a desert than a habitable country. The ground is mostly very sandy, and although naturally not unproductive, it is sterile for want of moisture. Enormous bushes of *Euphorbia neriifolia* take the place of what elsewhere might be a forest, or at least a thick jungle. A few fig-trees near the villages is all that may deserve the name of a tree, and even these are by no means plentiful. During a tolerably good rainy season, the fields generally yield a crop of either barley or wheat, or other seasonal fruits; during the cold weather, however, scarcely anything but a very inferior crop of cotton can be earned; and this only locally. A fair crop is, however, generally possible, wherever the people are able to obtain a sufficient quantity of water from the wells for irrigation. In this they often succeed best in those localities which lie along, or not far from, a fault in the rocks, because this usually stops the escape of water. Whatever mischief the numerous trap-dykes and basaltic eruptions might have produced at no very distant geological period, it is very fortunate for the country, that they are so numerous; for I would scarcely hesitate to say that without them by far the greater part of Kachh would long ago have become a perfect desert. Each village has, it is true, its small tank, but unless the retention of water is facilitated by some natural cause, it is sure to have dried out about the middle of the cold season. Wherever a tank with good deep water exists by the end of February, it is almost certain to have been washed out in a hollow of clayey beds, or it rests towards a fault of the rocks, or a quartzite or trap-dyke. In some cases men might have taken advantage of the natural situation, and assisted the reservoir by an embankment, but as a rule, the Kachh people seem to be rather indifferent to this necessity of human and animal comfort, and in this special case, one might justly say, the necessity of life.

Out of the great number of tanks, which are, strictly speaking, the only water reservoirs, five or six average a mile, or a little more, in length, and might deserve the name of small lakes. In other parts of India they would probably be little thought of, but in a dry country, such as Kachh is, they are of no small importance. In the monsoon time they are of course of greater extent, but even at the greatest height of the water supply, the low situation of these reservoirs, sometimes in deep hollows, precludes the use of the water for purposes of irrigation; they are, however, during the cold season the only places to which a large number of waterfowl of all kinds resort.

Having thus become acquainted with an outline of the physical features of Kachh, we may better be able to understand the association of the mam-

mals and birds which I shall enumerate in the following pages. Of course judging from both the uniformity, as well as the scarcity, of favourable natural conditions, one could *a priori* only expect a very poor fauna and flora. The vegetation of the country in general, setting aside that of the cultivated tracts, may indeed be regarded as a picture of sterility. Very few flowering plants are to be seen in the dry season. Among the herbaceous plants* those growing on sandy or saline ground naturally prevail over others, and their leaves are often leathery and thick, or sometimes reduced to spines and thorns. Among saline plants the most common are *Statice Stocksii*, *Solanum trilobatum*, and a *Pluchea.* Of other more common species of herbaceous plants I may notice: *Trichodesma indicum*, *Heliotropium supinum* and *strigosum*, *Solanum nigrum*, *Crotalaria Burhia*, *Orygia decumbens*, *Phalangium graminifolium*, *Vahlia viscosa*, *Salvia ægyptiaca*, *Convolvulus pluricaulis*, *Cressa Cretica*, *Polygala Vahliana*, *Glinus mollugo*, *Polygonum plebejum*, *Euphorbia thymifolia* and *E. dracunculoides*, *Evolvulus alsinoides*, *Aristida depressa*, *Ærva Javanica*, *Vernonia cinerea*, *Trianthemum crystallinum* and *T. decandrum*, and others. Mr. Kurz determined about one hundred species out of a small collection I made; a few appear to be new. The low jungles barely deserve this name, for they are almost entirely composed of thorny bushes (*Capparis aphylla*) with little or scarcely any foliage. Among others I may mention *Tamarix orientalis*, *Celastrus senegalensis*, two species of *Grewia*, and *Cratæva Roxburghii*, the last growing into a tree, also Kunda (*Prosopis spicigera*,) is locally numerous, but scarcely more generally distributed than the *Cactus* like *Euphorbia neriifolia*, which often for miles suppresses all other semiarboreal vegetation. The only fine trees to be occasionally seen are *Ficus religiosa* and *F. Bengalensis*, in the neighbourhood of villages or near wells, where they are planted as a shelter against the heat of the day.

Extensive forests are, as already observed, unknown, and, naturally, we would look in vain for any of the large Carnivora, (except as mere stragglers), and the existence of large Pachyderms or Ruminants is made entirely impossible. Equally so we almost entirely miss the true forest denizens of the feathered tribe, such as the *Bucerotidæ*, *Picidæ*, *Certhiidæ*, *Sittidæ*, *Phasianidæ*; a few of the Eastern type of birds like the *Eurylaimidæ* or *Treronidæ* are also entirely absent, their geographical distribution† being rather limited. But other families, which might be expected to

* I am indebted to Mr. S. Kurz for the names of the plants.

† Too much importance is I think, occasionally attributed to the so-called laws of geographical distribution, independently of other agencies, as if these laws were innate to the animal. When speaking of the geographical distribution of a species, one is apt to forget, that these geographical limits are *mainly* dependent upon the physical conditions, required for, and suitable to, the existence of a certain species.

occur, likewise shew very few representants, such as the *Muscicapidæ*, *Ampellidæ*, *Fringillidæ*, *Corvidæ*, &c.

Among the brushwoods the common birds are *Pycnonotus chrysorrhoides* *Otocampsa leucotis*, *Lanius vittatus*, *Iora Zeylanica*, *Sylvia curruca*, *Munia Malabarica*, &c., less numerous are *Phyllopneuste rama*, *Pericrocotus peregrinus*, *Orthodomus longicaudus*, *Drymoipus Jerdoni*, *Phylloscopus tristis*, *Tephrodornis Pondiceriana* and a few others, while *Parus nuchalis* or *Leucocerca aureola* are great rarities. Hunting between the bushes on the ground, we meet with *Thamnobia Cambayensis*, *Citrinella Huttoni* and *Chatorhea caudata*, always in company with *Franklinia Buchanani*, and on still more open ground *Saxicola picata* and *deserti* (= *atrogularis*). The above are actually the only very common birds, and five of each may at any time be seen for every one of any other kind.

In the sandy plains we meet with a great number of GRALLÆ, particularly *Otitidæ* and *Charadridæ*. Among these *Cursorius Jamesoni* (?=*gallicus*), *Chettusia gregaria*, *Lobivanellus indicus*, *Sarciophorus bilobus*, *Grus cinerea*, *Houbara Macquenii*, are characteristic of the country ; several of these depart during the summer, but are replaced during the rains by the Florikan, *Sypheotides auritus*, which is said to arrive in large numbers in the rainy season.

The starlings, grey partridges, pigeons, and doves keep, naturally enough, near the villages. In the fields few other larger birds except *Geronticus papillosus* and *Buphus coromandus*, and occasionally *Grus antigone*, are to be seen ; of smaller birds *Agrodroma campestris* and several species of larks are common. Both Grallatores and Natatores are abundant on the small lakes and tanks. Indeed scarcely a pool of water, if only thirty or forty feet in length, will be met with without some species of *Actitis* or *Totanus*, but particularly common are *Himantopus intermedius*, *Spatula clypeata* and *Querquedula crecca*. On the somewhat larger tanks one is certain to meet besides these with the gadwall (*Chaulelasmus streperus*), the pintail (*Dafila acuta*), the little grebe (*Podiceps minor*), and also *Limosa ægocephala* and one or the other of the white *Herodias*. Naturally in an open country, where sport is comparatively easy, birds of prey would not be wanting, and amongst* these *Falco jugger*, *Hypotriorchis chiquera*, *Aquila fulves-*

* A change in the physical conditions of a country will be rapidly followed by a corresponding change in the fauna, either decreasing or increasing, and thus the geographical limits of a species become *mainly dependent upon physical conditions*. To give an example, I mean, that if for instance one of the low hill ranges of Kachh, averaging a height of a few hundred feet, was replaced by one of similar mineralogical character and of an average height of 5000 feet, we would very soon find it wooded, and then inhabited by an abundance of Malabar forms, although these would be absent in the intervening desert country. An actual example of this may be seen on Mount Aboo, as known from Dr. King's list of birds.

cens and *Buteo ferox* are to be seen almost everywhere; many others are more local.

Perhaps a better general idea of the character of the vertebrate fauna might be formed, when we inquire what the country is capable of supporting all the year round, and at the same time exclude those animals, the existence of which mainly, or entirely, depends upon the presence of man and his habitations.

Among the mammals we find the Rodents most prevalent,—*Gerbillus erythrourus, Sciurus palmarum, Lepus ruficaudus,*—the first being by far the most common, and next come the Indian antelope and gazelle; thus all vegetable feeders.

If we exclude from the 160 species of birds, which I obtained, the so-called camp-followers, we find that about half the remainder are migratory, therefore merely winter visitors. And although some of the migratory birds may in a favourable hot season remain in the country, others which are generally considered as permanent settlers often partially migrate to more suitable localities in India. Among these I may mention for instance *Ceryle, Pratincola, Coracias, Ptionoprogne, Caprimulgus, Citrinella.* Therefore, in an ordinary summer season I certainly do not expect that more than about one hundred species of birds are to be met with in Kachh, really a very small number, when compared with what one is used to observe on a similarly large area in many other parts of India.

Of Reptilia and Amphibia I have observed thirty species; and, although this number is decidedly larger during the rains, not more than half a dozen of them are really of common occurrence. (Comp. Proc. A. S. B., May, 1872, p. 71).

The fresh-water fishes, which I collected, belong, according to Dr. Day, to eighteen species; there is only one Siluroid among them, most of the others belong to the *Cyprinidæ*, and one is a *Cyprinodon*, the first species of the genus known in Indian fresh-waters. However small the number may appear to be, I almost doubt if it could be much increased; for where rivers are almost unknown, and where half of the tanks are liable to disappear for several months during each year, and where besides such a number of skilful fishers* are eagerly employed during a time when the water is lowest, fish have not much chance to prosper.

* About forty species of *Grallatores* and *Natatores.*

*MAMMALIA.**

Primates.

I have only on a single occasion seen a *Presbytes* which appeared to be in a wild state. It came towards the evening to drink at a tank some distance from the fort Kanmir (in the south-eastern part of the Wagur district), and as its entire face was jet black, I presume, it was more likely *P. priamus* than the Bengal *P. entellus*, but I could not approach sufficiently near to ensure the identification.

Besides that, I saw both *Inuus rhesus* and *Macacus radiatus* in captivity, but they appear to have been imported.

Chiroptera.

The notes on this order have been kindly communicated to me by G. E. Dobson, Esq., B. A., M. B.

Fam. Rhinolophidæ.

Phyllorhina fulva, Gray.

Of the specimens of this species obtained, two, a male and female, were taken at the same time and place. The fur of the female specimen is bright golden yellow, that of the male white at the base of the hairs for more than three-fourths their length, the remaining portion to the tip dark purplish brown. The male is larger than the female which is apparently not quite adult.

This proves the identity of *Ph. fulva* with *Ph. murina* and *Ph. cineraceus*, and leads to the belief that *Ph. ater* and *atratus* are also synonyms of the same species. This remarkable variableness of the colour of the fur is not, however, confined to this species, it is met with also in other Rhinolophine bats; in *Ph. larvata*, Horsfd., for example, where the colour of the fur varies from bright orange fulvous, with brownish or ferruginous tips, to bluish black with black tips, a circumstance which has given rise also to much confusion, as the species has received as many names as the different colours of its fur. The same remarks apply to the species of other families of Chiroptera, notably to the Pteropidæ.

Other male and female specimens of this species were also obtained about the same time, the fur of all presents the same colour:—white with dusky tips to the hairs. This shows that the colour of the fur in *Ph. fulva* does not depend on locality, or season. The smaller size of the fulvous female specimen referred to above, taken with its less perfectly developed

* The systematic names and further observations on the species recorded will be found in Jerdon's 'Mammals of India,' except in a few cases where a special reference, or a description, is added.

teeth, and apparently not quite complete ossification of the extremities of the metacarpal and phalangeal bones, indicates age as a very probable cause of the differences of colour that have been observed. The young of the first and second year most probably present this golden fulvous hue which gradually changes to white, as the animal attains the adult condition.

The following table gives the measurement of the two specimens first referred to; and of another, an adult female, from the same locality, with white fur, tipped with purplish black.

	♂	♀	♀
Length, head and body,	1.9	1·75	1·9
„ tail,	1·15	1·15	1·1
„ * head,	0·75	0·7	0·75
„ ear, anteriorly,	0 85	0·8	0·85
Breadth, ditto,	0 65	0·65	0·65
Length, forearm,	1·55	1·55	1·55
„ thumb,	0·3	0·3	0·3
„ second finger,	2·45	2·4	2·5
„ fourth ditto,	2·0*	1·9	2·1
„ tibia,	0·7	0·7	0·72
„ foot and claws,	0·32	0·32	0·32

Generally distributed, but not common.

* *Fam.* Rhinopomatidæ.*

Rhinopoma Hardwickii, Gray.

This species is extremely common, usually taking up its abode in wells. All possess large accumulations of fat posterior to the anus, in much greater quantity than usually observed, the mass of fat in many individuals probably much exceeding in weight the remainder of the body.

Fam. Noctilionidæ.

Taphozous Kachhensis, Dobson, n. sp.

In form, colour of the fur, and size corresponds very closely with *T. saccolaimus*, Geoff., but easily distinguished by the complete absence of the gular pouch in both male and female. A small fold of wing-membrane forms a shallow pouch in the angle between the radius and fifth metacarpal bone, much less developed than in *T. longimanus*, Hardw. Ears as in *T. saccolaimus*, but slightly larger, and the tragus is naked; inner margin bordered with a row of small papules.

* I have formed this family, provisionally, for the reception of the genus *Rhinopoma* of which the type, *Rh. Hardwickii*, is the sole representative. This genus has been classed by Drs. Gray and Peters with the *Megadermatidæ*, but, on carefully comparing the skeleton of *Megaderma lyra* with that of *Rhinopoma Hardwickii*, I find not the least osteological connection. The genus is, evidently, far more closely related to some of the genera of *Noctilionidæ* than to *Megaderma*.

		♂ Inches.	♀ Inches.
Length,	head and body,	3·35	3·6
"	tail,	1·15	1·25
"	ditto, free from membrane,	0·5	0·4
"	head,	1·2	1·3
"	ear (anteriorly),	0·9	0·9
Breadth	ditto ditto,	0 5	0·5
Length,	tragus,	0·24	0·24
Breadth,	ditto (greatest),	0·17	0·18
Length,	forearm,	2·65	2 95
	thumb,	0·45	0·45
"	second finger,	4·4	5 0
"	fourth ditto,	2·3	2·8
"	tibia,	1·0	1·1
"	calcaneum,	0·85	0·9
"	foot and claws,	0·55	0·65

Fam. VESPERTILIONIDÆ.

Genus. VESPERUGO Keys. Blas. Sub-genus *Pipistrellus*, Gray.

PIPISTRELLUS LEUCOTIS, Dobson, n. sp.

Ears triangular with rounded tips; outer margin slightly concave beneath the tip, then convex, emarginate opposite the base of the tragus, and terminating in a small lobe. Tragus slightly curved inwards and rounded at the tip. Glands of upper lip well developed, causing a slight depression on the face behind the nostrils. Tail long, wholly contained within the interfemoral membrane. A well-defined, rounded lobe posterior to the calcaneum.

Ears, sides of face about the eyes, interfemoral membrane, antehumeral membrane, and that portion of wing-membrane along the sides of the body, white, very translucent; remaining portion of wing membrane sepia, traversed by white reticulations. Fur, on the upper surface, black at the base of the hairs for about half their length, remaining portion light yellowish brown; beneath, somewhat similar.

The fur of the head extends forwards as far as the labial prominences which are thinly covered with a few short hairs; in front of the ear and about the eye the side of the face is almost naked. On the upper surface the fur of the body extends outwards, covering the proximal third of the humerus and the wing-membrane thence, backwards, to the knee joint; posteriorly, the anterior third of the interfemoral membrane is covered; beneath the fur of the abdomen extends upon the wing-membrane to nearly the same extent as on the upper surface, and the interfemoral membrane is clothed with a few, short hairs.

Upper incisors long, blunt, with a distinct cingulum; outer incisors minute, scarcely exceeding in vertical extent the cingulum of the inner ones, placed close to their sides, and separated from the canines by a small space on either side. First small premolar in the upper jaw, in the angle between the closely approximated canine and second premolar, very minute, not distinguishable without a lens.

The following are the measurements of two adult male specimens. The measurements in the first column are those of a specimen in the Indian Museum from Rajanpúr, sent by Dr. W. F. Murray, Assistant Surgeon 3rd Panjáb Cavalry, and not previously described; the second column relates to the Kachh specimen.

Hab.—Rajanpúr, Panjáb frontier; Kachh.

	Inches.	Inches.
Length, head and body,	1·7	1·8
„ tail,	1·5	1·55
„ head,	0·65	0·65
„ ear (anteriorly),	0·55	0·55
Breadth, ditto,	0·35	0·35
Length, tragus,	0·22	0 23
Breadth, ditto,	0·07	0·07
Length, forearm,	1·30	1·35
„ thumb,	0·2	0·22
„ second finger,	2·25	2·25
„ fourth finger,	1·7	1·7
„ tibia,	0·5	0·5
„ calcaneum,	0·55	0·55
„ foot and claws,	0·25	0·25

Besides these four species the only other bat I observed was a large *Pteropus*, of the size of *Pt. medius*, Tem.; I saw it on several occasions about Bhúj, but failed to secure a specimen.

Insectivora.

The only shrew which I obtained, and which is far from common, belongs, according to Dr. Anderson's determination, to *Crocidura murina*, Lin.

Of hedgehogs also one species occurs. It represents a new species.

Erinaceus (Hemiechinus*) pictus, n. sp.

Head elongate, pyramidal; snout produced, considerably extending beyond the lower jaw, with the nostrils somewhat swollen, representing a longitudinal slit on the upper side; ears moderate, obtusely rounded at tip, and rather abruptly truncate laterally; a very conspicuous, almost perfectly nude,

* Fitzinger (Sitz. Akad. Wien, M. N. Klasse, 1867, vol. 56, part I, p. 858,) uses this name in a generic sense, as distinct from *Erinaceus*.

tolerably broad space extends from the hind head towards the middle of neck; spines, beginning on neck slightly in advance of a line connecting the anterior basal edges of the ears, almost regular in young, but distinctly irregularly* interwoven in the more adult; each spine white on the basal half, then with a broad blackish brown ring, followed by a yellowish white tip, only the extreme point appearing slightly dusky; each is further surrounded by sixteen to twenty longitudinal grooves, separated by much broader and very finely tuberculated ridges; the minute tubercles being laterally compressed. Limbs long and slender, each with five claws; tail very short and concealed.

Snout, extending on the upper side as far as between the eyes and from there stretching as an oblique band through the eyes to the base of the neck, dark brown with very few whitish hairs intermixed; ground colour of ears brown, but thickly set with whitish hairs, lower jaw round the edges brown, chin and throat whitish tinged with brown in the young, almost perfectly white in adults; fore-limb beginning at the middle of the forearm, the hind limbs entirely, including the region of the vent between them and at their sides, and the tail chocolate brown; soles of feet blackish and all the claws white. Moustaches brown, whitish towards their tips, the longest nearly two inches. An oblique streak in front of and below the eye to the angle of the mouth, hind head and all round the neck, involving the base of the ears, the entire lower side from the chin, including nearly half the length of the fore-limbs, and extending backwards as far as the region between the hind-limbs white, the lower side being thinly clad with hairs which are throughout arranged in small tufts, each tuft evidently corresponding to a dorsal spine, as if each of the spines had been dissolved into its original component parts.

Total length of a specimen 5·5 inches; distance from tip of snout to anterior angle of eye 0·8; length of ear 0·55, and the greatest breadth about 0·4; length of carpus to tip of claws 0·8, the same of foot 1 inch, the heel tubercular; tail 0·4 inches, thickly covered with hair.

Besides this specimen which is the only one I preserved, I saw several others in the western part of Kachh, and some were decidedly larger; one measured 6·3 inches, the distance from the tip of snout to the eye being nearly 1 inch, and to the base of the ear nearly 1·5 inch. There are also several specimens of this species in the Indian Museum from the North West Provinces about Agra, and from Rájpútána. One of these measures nearly 7 inches from tip of snout to end of tail.

* The irregularity of the spines seems very much to depend upon the attitude of the animal. When the animal is at rest, and the spines are in their natural position, they are as a rule regularly directed backwards, but the moment the animal rolls in its body, they become interwoven.

In comparing the present species with the descriptions of hedgehogs known from Asia and adjoining territories, and which belong to the section *Hemiechinus*,—characterized by having the ridges on the spines tuberculated and five toes on all feet,—I find that *E. æthiopicus*, Ehrenberg, = *E. brachydactylus*, Wagner, is most closely allied to it. It slightly differs in coloration, in having the forehead white, the chest brownish; each of the tubercles on the spines is seated on a separate eminence, and the tail is longer. Other similarly coloured species are *E. algirus*, *ægypticus*, *pallidus* and *libicus*, all from North Africa, but they more or less differ in structure. Besides that there are two other African species *E. platyotis* and *pectoralis*,* both of which are quite different in coloration, and *E. auritus*, Pallas and *hypomelas*, Brandt, are from Northern Asia.

From India Jerdon describes out of the section *Hemiechinus*, *E. collaris* and *micropus*, the former being found in Northern, the latter in Southern India.

In *collaris* the ears are externally somewhat indented, but not to any particularly large extent. The spines are rather long and cylindrical, usually with a broad black tip, each is surroundrd by 22 to 24 longitudinal grooves separated by equally broad ridges, which are rather sharp and somewhat distantly finely tuberculated.

Very closely allied to *collaris* are no doubt Bennett's *E. Grayi* and *spatangus*, both from the Himalayas; but until authentic specimens had been examined, it does not appear advisable to identify all three.

In *E. Grayi* each spine is stated to be yellowish white for more than half its basal length, followed by a narrow blackish ring, and again white at the tip. The coloration of the head and underside does not appear to differ from that of *collaris*. The ears are said to be long, obtusely pointed, but scarcely thickened towards the tip, and laterally not emarginate.

E. spatangus is said chiefly to differ by the regular position of the spines, but this is a character which very much depends upon the position of the body. It seems probable that the type specimen is only a young one of *E. Grayi*, should this really prove to be distinct from *collaris*.

E. mentalis, Gray, also from the Himalayas, is recorded as distinguished from others by a black chin; nothing further is known of it.

In *micropus*, which is undoubtedly the same as *nudiventris*, the spines are thin, rather short, with a long point and of a similar colour as in *E. pictus*, but each is surrounded by 17 or 18 longitudinal grooves, separated by only very little broader ridges which are provided with moderately distant blunt, and nearly rounded tubercles.

From Afghanistan, Blyth described *E. megalotis*,† which in colouring more resembles *hypomelas* than *auritus*, each spine being dusky at base and near the middle, and blackish brown towards the tip, which again is paler. Each spine is further surrounded by about 28 to 30 longitudinal fine furrows, separated by about equally broad and fine ribs, which are minutely tuberculated; some of the ribs are occasionally thinner than others. This character alone separates *megalotis* from the two other allied species with large ears.

In looking over the specimens of hedgehogs in the Indian Museum I noticed an apparently new species which was lately collected by Dr. Henderson when accompanying the Yarkand expedition, and I shall give a short description of it under the name of

* Fitzinger in Sitzb. Akad. Wien, M. N. Klasse, vol. 56, part I, p. 859.

† Journ. Asiat. P. B. vol. XIV, p. 353 and vol. XV, p. 170.

Erinaceus (Hemiechinus) albulus, n. sp.

Snout very long and pointed, ears moderate, ovate at tip; spines irregularly placed, much as in *pictus*, but comparatively longer and thicker; each of them is dusky at the base, then up to half its length purely white, followed by a blackish brown ring, its breadth being only about one fifth of the total length, tip largely white and rather abruptly pointed, the result being a prevalence of white colour on the upper surface of the body. There is no perceptible nude space between the ears, and the spines begin immediately on the hind neck, and the largest on the back are fully one inch long. Each spine is surrounded by 24 to 26 fine longitudinal furrows, separated by minutely tuberculated ridges, scarcely wider than the furrows. The tail is almost as short as in *pictus*.

Head entirely rufescent above and at the sides, except upper mandible towards the angle of the mouth, this being white; base of ears also white, as well as the entire underside, which is thickly set with long hairs, passing into a slight rufescent shade on the sides of the belly. Ears, lower portions of front and hind feet and tail dusky brownish, being thickly intermixed with short, white hairs; moustache brown, whitish towards the tip. Claws strong, five on each foot, very pale brownish.

The only specimen measures very nearly seven inches; the ear slightly exceeds one inch; distance from tip of snout to the angle of the mouth not quite one, to the ear slightly more than one and a half inch. Dr. Henderson gives the locality, 'Langur near Sanju; Yarkand,' and the native name 'Keepa.'

The only known form to which the present species is closely allied is *E. lybicus*, Ehrenb., which has similarly grooved and similarly coloured spines, but they are decidedly shorter, and the coloration of the other parts of the body is different.

From all the above noted species which, as I stated, are referable to the section *Hemiechinus*, *E. albiventris*, Wagn., differs by having only four toes on the hind feet, and the spines sulcated and smoothly ridged. The type specimen, which is 6·5 inches long, is believed to have come from the East Indies, but its precise locality is unknown; it is in the Berlin Museum. The distinctive characters noticed also occur in the Ægyptien *E. Pruneri*, and Fitzinger separates both as '*Peroëchinus*.'

The true *Erinacei* have five toes on each foot and smoothly striated spines. Of the five species known only *E. europæus*, namely the Siberian variety, may be found in the Himalayas.

Carnivora.

Ursus labiatus occasionally occurs in the Wagur district, and I was told of a specimen having been shot on Béla, but it is evidently only a very rare straggler.

I have not on a single occasion seen either a marten (*Martes*) or a weasel (*Mustella*), though I was told that at least one species of each does occur.

Of the *Felidæ*, both the lion (*F. leo*) and the tiger (*F. tigris*) extremely rarely occur as stragglers from Káthivár, they had been formerly shot in Kachh territory, and a century ago they might have been more common.

The larger variety of the pard (*F. pardus*), usually called panther, is up to the present time not uncommon in some districts. It keeps to the thinly wooded and rocky parts of the country, and its favourite sport constitutes a monopoly with the present Rao of Kachh.

The common jungle cat (*F. chaus*) is the only representant of the smaller *Felidæ*, and though not abundant it is met with occasionally throughout the country.

The red lynx (*F. caracal*) is, however, certainly rare, as it likewise is in other parts of India. I have only seen one animal shot some years ago by the Rao of Kachh, but I heard of it in different parts of the country. Like the pard, it seems to be very fond of digging after *Uromastix Hardwickii*, which in common with some of the inhabitants it appears to find a very tasty meal.

F. jubata, the hunting leopard, was seen by me only on one occasion in the Wagur district (north of Chitrore), but I could not obtain any information as to its further occurrence. It seems to be scarcely known in the western and southern parts of Kachh.

The striped hyæna (*H. striata*) also occasionally occurs in the eastern parts of Kachh, and about the Rann islands. I have, however, nowhere heard of a single *Viverra* or a *Paradoxurus*, which no doubt prefer forest to open country.

132. *Herpestes griseus*, called by Jerdon the 'Madras Mangoos,' is the only species of this genus, and generally distributed, though not very common. Body of a male 18″, tail 15″; a female which I shot was somewhat larger. The general colour of the fur above is (in winter) brown, grizzled with white; the longer hairs are adpressed and very long, particularly at the sides, each with four to five dark brown rings, separated by pale white, the two colours passing into each other by a rufous brown tint, which, during the summer, in some individuals at least, appears to prevail over the dark brown, and when in older skins the brown fades, the rings may be described as rufous, but they certainly are not so in fresh skins. The white rings generally have barely a tinge of yellow, in some specimens they may be said to be pale fawn colour. The elongated hairs at the lower side are broadly tipped with fulvous fawn, and those at the end of the tail are mostly of that colour, which in so far may be said to be concolorous with the body. The sides of the snout, particularly in front and about the eyes, are distinctly rufous, more so in the male than in the female, and the entire head is also tinged with more rufous, than any other part of the body. Ears light brown, thickly set with short hair, more mixed with white in front than behind. General colour below fawn, the rings on the hair being pale brown and on many nearly obsolete. Feet in front rufous brown, speckled with white; claws brown, pale towards the tips; soles dark fleshy brown; muzzle reddish brown.

The Indian Wolf (*Canis pallipes*) is tolerably common in the Wagur district and on the Rann, but less so in Western Kachh, while the jackal (*C. aureus*) abounds everywhere. Pariah dogs are, as may be imagined com-

mon enough, and some very much resemble in structure and colour the wild dog (*Cuon rutilans*), but I have not heard of the occurrence of this latter in a wild state.

Both the Indian and the desert fox, *Vulpes bengalensis* and *leucopus*, the latter generally called the silver-tailed fox, occur; the former I have shot only in the north-eastern districts, but the latter appears to be more generally distributed, though not very common.

Rodentia.

The homely *Sciurus palmarum* is the only species of squirrels to be met with, both about habitations and in the Kundu jungles.

The ground is claimed by the desert Jerboa-rat, which Jerdon identified with (No. 171) *Gerbillus** *erythrourus*, Gray.† I do not think that there is any other animal equally common throughout Kachh, as is this rat; it does of course not frequent stony and hilly ground, but is most abundant in the sandy districts between bushes, as well as between fields and on grassy plains; its barrows sometimes extent over hundreds of square feet without interruption. The size and colour of Kachh specimens perfectly tallies with Jerdon's description. Near habitations it usually comes out only in the morning and evening to feed, but far away from them it is to be seen out of its hole at all hours of the day. As a rule, it feeds, I believe, on roots of various herbaceous plants, and more rarely on seeds.

I hardly need to mention the occurrence of the brown rat (*Mus decumanus*) and of the common Indian mouse (*M. urbanus*).

Hystrix leucura is the common porcupine of the country; it is usually found on higher undulating desert ground, thinly covered with jungle, or on more elevated plateaus where brushwood occurs.

Lepus ruficaudatus is very abundant throughout Kachh. There is, (at least in younger specimens) a conspicuous white band from the nostril through the eye; the ears are lined internally with dull white, and externally towards the tips with blackish brown or black; the tail has in the young only a slight rufous tinge above.

Ungulata.

Equus onager, the wild ass, is entirely confined to the most uninhabitable and desert parts of the country near the Rann, or the Rann itself with its small islands; I have seen it on two or three occasions in crossing the Rann, but an approach to it even within half a mile was out of question.

Sus indicus is generally distributed, and fine sport may be had in suitable, temporarily swampy, localities, mostly near the Rann. Occasionally,

* Most naturalists accept for the Africo-Asiatic species the name *Meriones*.

† Comp. Jerdon, Mamm. Appendix, p. III.

I also met with solitary specimens, or small families of young, within the hills, as at Jora.

The common Indian antelope, *Antilope bezoartica*, is only found in the eastern parts of Kachh, towards Rájpútána, while the Indian gazelle, *Gazella Bennetti*, occurs abundantly throughout the country. Jerdon (Ind. Mamm. p. 281) says that '*Gazella Christii*, Gray, from Sind and Kachh, is said to be paler, and with the horns more slender, and smaller than in the Indian gazelle, and with the tips abruptly bent inwards.' I have seen a great number of animals shot in different parts of Kachh, and preserved also a few skins, but they do not exhibit the least difference from the 'Chinkára' of Central and Northern India.

Aves.

In the subjoined list I have included only those species of which I procured specimens, and of the identity of which I had been able to satisfy myself. In addition to these I observed a small number of others, and although the identity of some of them appeared to me at that time tolerably certain, I shall note them separately; for with the number of very closely allied forms one cannot be cautious enough in avoiding mistakes in determination. Among the species which I have not procured are: *Astur palumbarius* which I saw on several occasions kept by falconers, but I could not obtain information that the specimens were procured in Kachh. At the beginning of November, I noticed on the Jora hills a solitary specimen of a *Centropus*, it was either *rufipennis* or *viridis*. Both, *Alauda gulgula* and *cristata*, do, I believe, occur, and I was under the impression that my shikari secured specimens, but on examination none were represented. *Carpodacus erythrinus* was seen on two occasions in January. I am also tolerably certain of the occurrence of *Tringa minuta*, *Numenius arquata*, *Herodias alba*, *Anas boschas*, *Mergus castor*, *Casarca rutilla*, *Podiceps cristatus*, *Anser indicus* and *cinereus*; all these, besides a great number of other water-fowl, were seen on the large lake at Bhimsir near the Denodúr hill, and also S. W. of Barasir in the Charvar range. At the former locality I also observed one or two species of *Gallinula*, and a small *Porzana*. On two occasions I saw in the western part of Kachh what at the time I took for solitary specimens of *Ciconia alba*, and on one occasion a solitary *Cic. nigra*. When crossing the Rann from Kachh to Pacham early in November, I noticed several *swans*, but at too a great distance for it to be possible to form an idea as to the species the birds belonged to; a large *Cursorial* bird was also rather common, but I could not get a shot at him. It had the appearance of a gigantic *Chettusia*, being about double the size of *Ch. gregaria*, and somewhat similar in coloration.

2.* Otogyps calvus. Not common.

5. Gyps Bengalensis. Very common.

I examined several nests in the second half of December and in January; all contained only one egg. On the 11th January at Kunria, one nest had a nestling which must have been a week old.

6. Neophron Ginginianus. Very common.

8. Falco peregrinus. Not common.

10. F. jugger. Very common.

During January, I have generally seen them in pairs, and on the 10th Feb., near the village Tappur in Eastern Kachh, a pair had a nearly finished nest on a large Kundú, near the edge of a tank. The bird is a great favourite with native Falconers.

12. F. Babylonicus.

Comp. Jerdon in Ibis for 1871, p. 240.

Only a single male specimen was seen and shot near Kantkote in Waggur district, on 12th January.

16. Hypotriorchis (Turamtia) chicquera.† Very common.

17. Tinnunculus alaudarius. Common.

23. Micronisus badius. Common.

I shot one male and two females in December and January, all had the iris bright yellow. *M.*—wing 7·5, tail 6, tarsus 1·8. *F.*—wing 8·6—8·9, tail 7·2—7·4, tarsus 2 inch.

24. Accipiter nisus. Not common.

25. A. (Hieraspiza) virgatus. Not common.

29. Aquila bifasciata, Gray and Hardw. Not common.

Comp. Brooks in Proc. Asiat. Soc. Beng., April, 1872, p. 65.

Jerdon says that *bifasciata*, Gray, is the same as *vittala* of Hodgson.

29. A. fulvescens. Very common.

45. Buteo ferox. Very common.

I have seen hundreds of these birds, all were of the *B. cannescens* type, but not one of the uniform coloured type, called *fuliginosus* by Hume. The latter I got from Kotegurh near Simla. (Comp. Jerdon in Ibis, 1871, p. 338).

48. Poliornis teesa. Common.

51. Circus pallidus, Sykes = Swainsoni, Smith. Very common.

Gray (Handlist, I, 37) gives Sykes's name the priority.

55. Haliastur indus.

Only seen near the sea shore.

* The numbers prefixed to the names correspond with those in Jerdon's 'Birds of India,' or their nearest allies.

† I would decidedly prefer adopting the subgeneric name *Turamtia* for that of *Chiquera*, than altering the latter well known specific denomination to '*typus*.'

56. Milvus govinda. Very common.

The details in coloration are exactly as recorded of *govinda,* though they do not in any essential point appear to differ from those of *affinis* (Comp. Hume, Scrap-book, p. 320). Measurements of two specimens: wing 17·5 and 17; tail 10·6 and 11·25; tarsus 2·1, midtoe without claw 1·6 and 1·8, its claw straight 0·7 and 0·75; bill from gape 1·7 and 1·65 inch. This is as far as I saw, the only kite found throughout Kachh. A pair was breeding on a tree near Sumrasir on the 14th November.* Gray (Handl., I, 26) gives *melanotis,* Tem. and Schlegel, which was shown by Blanford to be identical with *M. major* of Hume, as a synonym of *govinda,* but he places *affinis* of Gould in a distinct subgenus. *M. affinis* is added to the Indian fauna by Jerdon in Ibis for 1871, p. 343; but are these two races really specifically distinct?

67. Otus vulgaris. I have seen it only on three occasions.

69. Bubo (Urrua) bengalensis. Not uncommon in rocky ravines.

76. Athene brama. Very common.

82. Hirundo rustica. Common.

Wing 4·6; outer tail feathers 3·6, central 1·8; tarsus 0·4; midtoe and claw nearly 0·7 inch.

84. H. (Uromitus) filifera. Common.

This, Jerdon writes, 'must stand, it appears, as *H. ruficeps,* Lichtenstein,' but he thinks that the differences, said to exist between the Indian and African form, as pointed out by Mr. Gould, 'may perhaps still hold good.' Mr. Gould (Birds of Asia, Part xviii) says, that African examples differ by being smaller, by having a lesser amount of rufous on the top of the head, and a shorter tail. Now, these must be admitted to be very variable characters, in the Indian bird at least. I measured specimens with the wing varying from 4·4 to 4·8, and with the central tail-feathers from 1·3 to 1·6 inches long. The rufous on the head changes in Kachh specimens, (shot in winter), from deep rufous brown to a pale rusty.

85. *bis* H. (Lillia) erythropygia. Very common.

Wing 4·1 to 4.3, tail 2·8 to 3·3. True *daurica* occurs in the Satlej valley, where it is far from rare, and I also have a specimen of it from Western Bengal, shot by Mr. Ball during the winter of 1870; it is, therefore, not a restricted hill form. It differs not only in size, but also in the form of the bill, this being in *daurica* more contracted towards the tip and slightly longer.

90. Ptionoprogne concolor. Very common.

Wing 4 to 4·2, tail 1·9 to 2 inches, the central feathers from 0·1 to 0·2

* I have seen a pair of *govinda* copulating on 5th September, and before I left Calcutta on 10th October, they had their nest ready in front of my window.

inches, shorter than the outer ones. The species is very abundant and its favourite haunt are tanks or grassy slopes of hills.

91. Ptionoprogne rupestris. Not very common.

I saw the species repeatedly hunting over tanks, in company with *H. rustica.* The measurements are slightly smaller than those given by Jerdon.

112. Caprimulgus Asiaticus. Not common.

113. C. Mahrattensis. Shot a single specimen on 26th January, at Daiselpúr in Wagur district, between fields. The bird perfectly agrees with that described by Jerdon.

117. Merops viridis. Very common.

123. Coracias indica. Common.

129. Halcyon Smyrnensis (= fuscus). Common.

The largest specimen measures; wing 5, tail 3·5, bill at front 2·3, from gape 2·9 inch. (Comp. Ibis, 1872, p. 4.)

134. Alcedo Bengalensis. Not common.

Wing 2·8, tail 1·3, bill at front 1·5, from gape 1·9, tarsus 0·35 inch.

136. Ceryle rudis. Common.

Wing 5·2 to 5·6; tail 2·75 to 3, bill at front 2·2 to 2·5, tarsus 0·4 inch. Of two pairs shot the males are slightly larger than the females.

148. Palæornis torquatus. Very common.

160. Picus (Leiopicus) Mahrattensis, var.

An idem *P. Blanfordi*, Blyth!

This is the only woodpecker which I have met with in Kachh. It would be difficult to identify it from Jerdon's account, and I give, therefore, a more complete description.

Forehead and part of top of head pale yellowish brown, with a more or less distinct golden lustre, (not pure yellow as Malherbe calls it); in the male occiput crimson, laterally extending to above the eyes, in the female dull yellowish brown, in both the occipital feathers are conspicuously lengthened; neck above with a broad uniform dark brown streak from the occiput downwards; lower neck, back and rump with longitudinal brownish black and white streaks, each feather being black along the centre; on the base of the lower tail coverts the white predominates, but of the longer tail coverts each has a large triangular central spot; tail blackish, each feather with 5 or 6 transverse, on the quill interrupted white bands; shorter wing coverts nearly uniform brownish black, longer coverts and all the wing feathers with along the middle of each feather interrupted bands, primaries dusky brown, and the white on them suffused with pale sulphur, secondaries and tertials much darker, particularly on the outer web. Lores, round the eye, about the angle of the mouth and chin in front fulvous white, ear coverts fulvous-ashy white or pale ashy; sides of neck, chin and breast

in the middle almost pure white, a brown broadish band extends from behind and below the ear coverts to the sides of the breast; lower plumage and under tail-coverts dull white with a brownish streak to each feather, a crimson patch on the middle of the abdomen; the white bands on the tail feathers are tinged with pure yellow, particularly towards the tips of the feathers. Bill plumbeous; feet blackish ashy. Wing 3·75 to 3·9; tail 2·3 to 2·4; bill at front 0·8 to 0·9, from gape 1· to 1·1; tarsus 0·6 inch; foot about 1·5. Fourth primary the longest, first 2·2 inch. shorter, second 0·4 and third 0·05 shorter than the fourth which exceeds the fifth by only a trifle.

These are the average measurements (from skins) of three males and two females; the former differ from the latter only by the crimson occiput, and sometimes also by a slightly smaller size, &c.

Not common, but occurring throughout Kachh, in the thinly wooded parts of the province, on trees as well as on *Euphorbia* bushes. It is a rather shy bird, and has a particular liking to hunt for insects towards dusk; I shot it often when it was almost dark, flatly clinging to the bark of a tree.

Looking at the comparative small size of the Kachh birds, I was at first inclined to separate them as a distinct species, but, on the suggestion of Mr. Hume, and after careful comparison, I am convinced that they represent nothing more than a local race of *Maharattensis.* I find that all the specimens of the latter from Bengal and Central India in the Museum have less white above, the white spots on the feathers being smaller, and that their 1st primary is a little shorter and narrower, being 0·8 inch. long, while in the Kachh variety it is usually broader and 0·9″, or even 0·95″ long. But in both it has three white spots on the inner web and one at the base of the outer web. The proportions between the other primaries agree in both. The bill in Central India *Maharattensis* is a little slenderer at the base and altogether somewhat longer. The wing, I find, to differ between 4 and 4·3 inches, but a specimen said to be from Simla has the wing only about 3·8 inch., and Beavan (Ibis, 1865, vol. I, p. 410) gives the wing of a female from Manbhúm as 3·88 inch.

Blyth's *P. Blanfordi* (Journ. A. S. B., XXXII, p. 75), 'is just barely separable as a race,' as its author truly remarks. I do not believe that it differs specifically; that is, I believe, that the Barmese bird is connected with true *P. Maharattensis* by intermediate forms of indefinable gradations. The type specimen has the wing 4, tail 2·45, tarsus 0·7, bill at front 0·9 inch. The white blotches on the upper plumage are again slightly larger than in the Kachh variety, but in all details of coloration both perfectly agree. The first primary is in the Barmese type only about 0·6 inches long, and the 2nd and 3rd are comparatively also a little shorter, but they do not appear to have attained their full size in that specimen. It is noteworthy

to observe that such a marked form of a wood-pecker, as *P. Maharattensis* represents, deviates from the type on the two extreme limits of its geographical distribution in an exactly similar manner, namely, by decreasing in size and adding more white to its plumage.*

214. Eudynamys honorata, Linn.

E. orientalis apud Jerdon. Comp. Ibis for 1869, vol. v, p. 338 and for 1872, p. 15.

Rare during the cold and dry seasons, but said to be very common in the rains, when it breeds.

220. Taccocua sirkee.

Above dusky brownish grey with a slight greenish lustre, which is most distinct on the tail, tertials, secondaries and tail feathers with close duller crossbars, only perceptible in certain lights; top of head with a slight rufescent tinge; feathers on head and neck black-shafted, glistening, bristly in front, the remainder on the upper side brown shafted; lores and chin whitish, sometimes with a faint reddish tinge, above and below the eye narrowly white, bristles on eyelashes black, pure white at base; upper breast ashy very slightly tinged with ferruginous, lower breast, vent, sides, lower wing coverts and tibial feathers pale ferruginous; lower vent and lower tail coverts dusky ashy brown; outer tail feathers dark brown, broadly tipped with white. Average measurement of 3 specimens: Wing 6—6·25; tail 9 to 9·5; tarsus 1·6 to 1·7; bill from gape 1·5 inch., cherry red, yellow towards the tip and the upper mandible blackish at the side.

I have seen this bird only on a few occasions; it hides itself usually in *Euphorbia* bushes, and is most difficult to flush. Often it manages to run from one bush to another at a tremendously rapid pace, pressing its body to the ground like a rat. I have seen it feeding on insects on the ground.

* I take this opportunity of drawing attention to what appears to me to be often an *a priori* somewhat unnatural explanation of facts. When a naturalist has noticed and described a form which combines the characters of two well marked races, or species, and the geographical distribution of which falls within the limits of the two; other naturalists are, often without hesitation, ready with an explanation in stating, that the intermediate form is 'evidently a hybrid between the two.' This in many instances looks very plausible, but is it natural? or even *a priori* probable? These questions seem to me to require thorough study and examination. Why should we *a priori* presume that there exist two entirely distinct types? Does it not look more natural to assume *a priori* that the so called intermediate form within the geographical limit of a certain type is the typical species, and that, as it extends, it deviates in a somewhat different manner in various directions? and that the peculiarities acquired in order to maintain subsistence at certain localities may even remain constant and be inherited within those certain local limits?—I think in many cases this latter explanation will prove to be the more probable one, although I do not by any means wish to abandon altogether the former.

234. Arachnechtra asiatica* = curucaria, Linn. Common.

On one occasion I shot a young male while sitting on the top of a tree, about 40 feet high, and engaged in occasionally darting after passing insects, which it appeared to catch, every time returning to its perch like a fly-catcher. In four males, wing 2·05 to 2·2 inches, tail 1·25 to 1·5; bill 0·65 to 0·7; tarsus 0·6.

255. Upupa nigripennis, Gould, vel *Ceylonensis*, Reich.

Comp. Jerdon, Ibis, 1872, p. 22.

Wing 5·3, tail 3·8, bill at front 1·75, tarsus 0·8 inch. The posterior feathers of the crest have distinctly white preceding the black tip, but the first primary has no white and the succeeding have it on both webs. The 4th primary is barely longer than the 5th, the 1st is 2·5 inches shorter than the 4th; the 2nd is 0·7 inches shorter, and the 3rd 0·1 shorter than the 4th. There is scarcely any ashy colour on the sides of the neck or breast.

Jerdon says, that the 'white spot on the first primary is occasionally present,' I may add, it is also the case as regards the white on the crest. What is then to remain to be the distinctive character between the present form and *epops*? I have great doubts about the Indian hoopoe being separable as a sufficiently distinct and definable species. There is no distinction in plumage, and the only difference I can see, in comparing about half a dozen specimens of each, is, that *nigripennis*, or *Ceylonensis*, is a smaller and lighter bird, with the first primary shorter and narrower. Still I cannot but doubt, that even these characters are so far constant, as to be of any use in defining distinct species. I am sure the European, Indian and even the Barmese hoopoe are merely local races of one species, not possessing a single character constantly distinct in one from the other.

I only saw few specimens at the end of October and in the beginning of November, but towards the end of the latter month, they became more numerous; it is, however, not a very common bird in Kachh, and must be, to a certain extent at least, migratory.

256. Lanius (Collyrio†) lahtora. Very common.

Wing 4·1 to 4·4, tail 4·4 to 5; bill at front 0·6 to 0·7; tarsus 1·1 to 1·3 inch.

Some specimens have a distinct white superciliary edge above the black, others no trace of it; the inner plumage on breast and vent sometimes has a very slight creamy wash, exactly as is often the case in the European

* I do not see the benefit of changing the name *asiatica* to that of *currucaria* as suggested by Jerdon, both being Linne's names. The former is retained by G. R. Gray in his Hand-list.

† G. R. Gray adopts *Collyrio*, Moehr., 1752, for the group of *Lanius excubitor*, reserving Linne's name *Lanius* for the type of *L. cristatus*.

excubitor; all the tail feathers have at least their extreme tips white, even the central ones, but only visible after a fresh moult, (which is also the case in the two next species).

A full account of this species will be found in Proc. Zool. Soc. London, for 1870, p. 595, by Mr. Dresser. On p. 596 the author says, 'rump and upper tail coverts white,' the description being taken from an old Panjáb bird. Now, it is strange that in about a dozen of specimens which I shot in Kachh, and some of which are decidedly very old birds in full plumage, the rump and upper tail coverts are albescent grey, in some the latter may be called greyish white, but that is the utmost limit of white. In fresh moulted old specimens the extreme terminal edges, of the upper tail coverts are blackish, but they appear very soon to wear of. Perhaps the distinction of possessing the rump and upper tail coverts white applies to the winter plumage, which I do not know.

257. L. ERYTHRONOTUS. Rare.

260. L. VITTATUS* (= *Hardwickii*, auctorum). Very common.

262. L. ARENARIUS.† Rare.

Bill at front 0·42 to 0·45, wing 3·5 to 3·6; tail 3·3 to 3·45, tarsus 0·9. These measurements are somewhat smaller than those generally given of the species. The young is striped in the usual way on the sides of neck and of the body, and on the chest. The light coloured band on the rectrices, such as is noticed by Viscount Walden in Ibis, vol. III, p. 224, is only occasionally present, perhaps in old birds. The species migrates during the summer to Western Tibet, where I saw it in the Indus valley.

265. TEPHRODORNIS PONDICERIANA. Not common.

The wing varies (in four specimens shot) between 3·3 and 3·4, none is 3·5 inch. The two outer tail feathers on each side are white, except at the base and towards the tip, there being only the sub-terminal outer, or both webs dusky; the 3rd and 4th last tail feather on each side generally have also a white edge about the middle of the outer web.

276. PERICROCOTUS PEREGRINUS. Very common.

The orange wing patch does not extend on any of the outer webs of the first 5 primaries. Wing 2·5 to 2·6, tail 2·7 to 3; tarsus 0·6 inch. (not $\frac{9}{10}$).

277. PERICROCOTUS ERYTHROPYGIUS. Not common.

I have occasionally seen flocks of this species hunting over high grass on dried up portions of tanks. In the jungles it is more often seen single, or in pairs.

* Ibis, 1868, iv, 316.

† Comp also Jerdon in Ibis, 1872, p. 115.

278. Dicrurus* albirictus, Hodgs. Very common.

Average of four specimens, young and old: bill 0·7 to 0·8; wing 5·4 to 5·65; tail 5·8 to 6·4, tarsus 0·8 inch.

I have never seen a herd of either cattle, or sheep, or goats, without a number of these birds accompanying it; they start with the herd in the morning and return with it in the evening.

The specific name *macrocercus* is restricted for the Java species.

292. Leucocerca aureola, Less. = *albofrontata*, Frank. Very rare.

361. Petrocossyphus cyaneus. Rare.

365. Planesticus atrogularis. Rare.

(Comp. Journ. A. S. B., 1868, vol. xxxvii, Pt. II, p 35)

Bill at front 0·6 to 0·7; wing 5·3 to 5·4; tail 4· to 4·1, tarsus 1·25.

385. Pyctoris sinensis. Very rare.

Bill 0·43; wing 2·55; tail 3·7; tarsus 1 inch.

438. Chatorhea caudata. Extremely common.

459. Otocampsa leucotis. Very common.

Wing 3·1 to 3·4; tail 3·2 to 3·5; tarsus 0·75 to 0·8 inch.

462. Pycnonotus chrysorrhoides, Lafr. = *pusillus* et *pseudocafer*, Blyth. Very common.

467. Iora zeylanica. Very common in low tree jungle.

Size the same as that given by Jerdon. Males and females had exactly the same colouring, during the winter, but *no black* above, the hind head and back are, however, in most specimens blackish green. In this stage they appear only to differ from *typhia* by their triflingly smaller size. (Compare Hume, Jour. A. S. B., vol. xxxix, pl. ii, p. 117, and Stoliczka, *ibid*, p. 310).

480. Thamnobia cambayensis.

(Comp. Journ. A. S. B., 1868, vol. xxxvii, Pt. II, p. 40.)

Extremely common throughout the country. The size is exactly the same as that of the southern form, known under the name *fulicata* in India. Male specimens which I shot in February had the upper plumage decidedly rather darker, in fact almost black, tinged with blackish brown, while specimens which I shot in November and December are almost entirely brown above, but the upper tail coverts are in all greenish glossy black. It seems to me clear that the two forms, as presently distinguished, merely represent seasonal or local faces of plumage of the one and same species.

I observe that Gray (Hand-list, I, p. 211) unites them under the name *Cambayensis*, reserving the name *fulicata*, Lath., for a South African species.

* This generic name is retained by G. R. Gray, and *Bhuchanga* of Hodgson considered as a synonym of it; but if the birds of the type of *D. longicaudatus* should at all be distinguished in a separate group from those of the type of *D. furcatus*, Gm., Hodgson's name should be retained as a subgenus for them, though I almost doubt that a real necessity exists for it.

481. PRATINCOLA CAPRATA. Very rare.

483. P. INDICA, ? = RUBICOLA. Very common.

Comp. Ibis, 1870, vi, p. 167, and 1871, p. 27.

♀ Wing 2·65, tail 2, tarsus 0·85, bill at front 0·4 inch.

This is the only specimen I saw during the whole winter; I shot it near Bhúj on 2nd January. Gray (Hand-list, I, 228) retains the Indian Bush-chat as distinct from the European, but I still think their identity can hardly be questioned, although Indian specimens may generally be smaller; I certainly disbelieve the existence of two separable species in India as *rubicola* and *indica*. As far as I remember I have seen in 1867 European specimens with all the distinctive peculiarities in colour of *P. indica*, Himalayan specimens of which I then compared with the former.

483*bis*. PRATINCOLA MACRORHYNCHA, n. sp.

I shot at the beginning of 1872 two specimens of a *Pratincola*, (probably females, the sex was unfortunately not determined), which appears to be distinct from any other as yet known.

General plumage, above, dull brown, all the feathers margined with pale isabelline or fulvescent whitish, most broadly on scapulars and tertials, narrowly on the quills; upper tail coverts nearly entirely uniform pale fulvescent or sandy, only along the centre of a darker hue. Central tail feathers brown, the succeeding also brown and very pale rufescent fulvous about the basal half of both webs, (not along the shafts), the rufescent colour gradually, not abruptly, passing into the brown; outer web of last tail feather wholly sandy or pale fulvescent white, and all have pale tips which, however, easily wear of. Lores and supercilium sandy white; ears dusky. Lower plumage fulvescent white throughout, with a slight shade of cream colour, all the feathers on their basal halves are dark slaty, which is also the case on the upper plumage. Bill and feet nearly quite black. Total length about 5·2″ to 5·5″; wing 2·85″ to 2·9 inch., first primary nearly 1″, and 1·2″ shorter than the second, which is very nearly equal to the 6th and 0·24″ shorter than the fourth, this being the longest; the 3rd and 5th are subequal and very little shorter than the fourth; tail 2·1 to 2·25, tarsus 0·95 to 0·97; bill at front 0·48 to 0·5, from gape 0·72; hind toe and claw 0·57, hind claw alone 0·3; mid toe with claw 0.72 to 0·73 inch. The size of the bill, which is rather narrow and Saxicoline, and the length of the legs readily distinguish this apparently new species; it is not the female of *P. rubetra*, this having the basal half of the tail white, and the bill shorter and broad at the base. It is also not a female or young of *P. caprata*, moreover the length and slenderness of the hind claw does not agree with any *Pratincola*, nor even with *Saxicola*, but strange enough with *Oreicola* (= *Rhodophila*.

One of the two specimens was shot in January near Rápúr in the Wagur district, and the other in February near Bhúj, in both cases in an open desert country with scanty low bushes. These were the only two specimens, which I saw, but possibly the bird may not be so very rare; for I could never pay undivided attention to an ornithological subject.

489. SAXICOLA PICATA.

Comp. Hume, in Ibis, 1870, vi, p. 283.

Wing 3·6 to 3·75, tail 2·5 to 2·8; tarsus 0·9 to 0·95; bill 0·4 to 0·5. The female has exactly the same distribution of the colours as the male, but the black is replaced by blackish grey, the chin is rather whitish grey and the ear-coverts somewhat rufescent.

One full plumaged male has an indistinct white stripe above the lores, and all the tail feathers are distinctly tipped white, the black being subterminal. Some apparently younger males with a dusky black plumage have the forehead paler, but none shews the very marked creamy colour noticed in Gould's *capistrata*, which was shown by Hume to be a young male of *picata.*

491. S. ISABELLINA, Rüppel, (= *saltatrix*, Menét.). Rare.

Comp. v. Pelzeln in Journ. für Ornithologie für 1868, p. 27.

Wing 3·75, tail 2·3, tarsus 1·17, bill at front 0·57. A specimen from the the Somáli country, determined as *isabellina* by Blyth in the Asiatic Society's collection (now Indian Museum), only differs in having the wing about 0·2 inch longer, (comp. Tristram's statement in Ibis, 1867, p. 94); both have the blackish streak between the base of the bill and the eye, and the plumage is in every detail the same.

491*bis*. S. KINGI, Hume. (Ibis, 1871, p. 29).

A single specimen was shot in Wagur in January, and I do not remember of having seen another. Wing 3·55, tail 2·3, tarsus 1·, bill at front 0·56 inch. The first primary is 1·75 shorter them the 3rd. The coloration exactly agrees with the specimen described by Mr. Hume, who kindly pointed out to me the bird amongst a number of females of the next species.

492. S. DESERTI, Rüppel, = *atrogularis* and *montana*, Gould.

Very common. The wing of five males varies between 3·6 and 3·9, tail 2·5 to 2·7, tarsus 0·95 to 1·05, bill 0·45 to 0·5 inch. Most of the females are a trifle smaller (wing 3·5 inch.), than the males.

I have no doubt that Mr. Hume is correct (Ibis, 1870, vi, p. 283) in considering Gould's *S. montana* as the summer or breeding plumage of *atrogularis*. In Journ. As. Soc., 1868, xxxvii, Pt. II, p. 42, I have particularly noticed the pure white on the median portions of the wing feathers on Tibetan specimens, shot during the summer, and regarding which von Pelzeln (Ibis, iv, p. 308) says that they agree with an Egyptian specimen of *S. deserti*, except that the latter is smaller.

I perfectly remember African specimens of *S. deserti* which I repeatedly compared in 1867; they were no doubt on the whole a little smaller (on the average, I find in a note: wing 3·5, tail 2·5, bill at front 0·45, tarsus 0·95), than most of Indian specimens, but there was not the least difference in structure and colour between the two. Now, as Indian specimens occasionally equal in size African ones, and as the former, which undoubtedly represent one species, differ in the size of the wing from 3·5 to 4 inches, I do not see,—with all respect due to the opinions of Messrs. Gould, Blyth and other eminent ornithologists—any reason in regarding the Indian birds as specifically distinct from the African *deserti*. All we can say is, that African specimens are as a rule lighter and smaller, while Indian specimens are as a rule slightly heavier and larger, but I do assert that there are to be found specimens perfectly equal in size from both countries.

491. CERCOMELA FUSCA.

I have only seen solitary specimens in the hilly districts, between low bushes. The birds have much of the habit of a *Petrocossyphus*.

497. RUTICILLA RUFIVENTRIS.

This is the only redstart which has been observed; it was tolerably abundant from November until the end of February.

I shot 3 males and two females, and the measurements of all are considerably smaller than those given by Jerdon: ♂, wing 3·2 to 3·3; tail 2·4 to 2·6, tarsus 0·9, bill at front 0·4 inch. The females are a little smaller.

530. ORTHOTOMUS LONGICAUDUS. Common.

Lores and eyelids white. Tibial feathers pale rufous. I shot a specimen while hunting for insects between large stones of an old embankment at the Sir-talao in the south-western part of Kachh. It looked in every crevice or hole, disappearing and emerging again from among the stones, just like a wren. Other specimens I often saw hunting on the ground in *Euphorbia* bushes.

536. PRINIA GRACILIS. Not common.

Lores extending on the supraciliary edge white, tibial feathers pale rufous.

544*bis*. DRYMOIPUS JERDONI, (Blyth).

P ? n. sp, Journ. A. S. B., xi, p. 883 and xiii, 376.

P. Jerdoni, Blyth, J. A. S. B., xvi, p. 459.

Upper plumage entirely, and more or less distinctly, rufescent brown; margins of wing coverts, tertials and upper tail coverts slightly more tinged with rufescent, primaries on the edges of the outer webs pale rufescent; shoulder edge of wing, lower wing coverts and all wing feathers about the edges of the inner webs (not quite extending to the tip) rufescent whitish. Lores, supercilium and round the eye white; ear coverts white at the base,

greyish towards the tips, the grey colour also tinging the sides of neck. Lower plumage very soft, luteo-rufescent whitish, white on chin and abdomen; tigh coverts and lower tail coverts pale rufous. Tail above with rather close, but not very distinct, dull cross bars, all except the two centre feathers with an indistinct subterminal dark band and a well developed dull white tip. Bill above dark brown, paler towards the edges and below; feet pale fleshy.

Length about 7 inches; wing 2·05 to 2·20; tail 2·75; tarsus 0·75; bill at front 0·42, from gape 0·62 inch. (These measurements are taken from two carbolised specimens.)

This is undoubtedly the bird which Blyth first noticed as distinct from *D. sylvaticus*, naming it subsequently *D. Jerdoni*, but uniting it afterwards with *D. longicaudatus*. Jerdon (Birds, India, II, p. 180) doubts the correctness of this identification, and very properly so, I think. I have carefully compared the type specimen, presented by Jerdon, and I have no doubt that it is a distinct and good species. The type measures: wing 2·1, tail 2·6, tarsus 0·72 inch., (bill imperfect). This type specimen exactly agrees in plumage with those from Kachh, and there is another specimen received since by the Indian Museum from Nagpúr, very likely presented by W. T. Blanford. It is also exactly of the same size, as the type.

I found the species not unfrequently between low bushes, but secured only two specimens, which I prepared with carbolic acid. Mr. Hume kindly informed me that he named the bird *Drymoipus rufescens*, noting the distinctions from allied Indian species.*

544. Drymoipus longicaudatus.

In two specimens shot on 26th December, the primaries are edged with very pale rufous. There is no dark subterminal band on the tail, but all except the middle feathers pass into albescent towards the tips, which are conspicuously narrowed in one specimen. Lores, supercilium and round the eye white. The two specimens were procured in moderately high grass at the edge of a tank near the village Wandra, in the S. Western part of Kachh. Wing 2·85 and 2·95; tail 2·4 and 2·8; tarsus 0·75, bill at front 0·42 inch.

551. Franklinia Buchanani? (an *Cleghorniæ* Jerdon).

Out of three specimens shot in November and December, in one the upper coloration is rufescent brown and the head above almost quite rufous

* Since my account was written, Mr Hume's description of the bird appeared in 'Ibis,' vol. ii, No. 6, for 1872, p. 110. A full account of the bird will be found in that place. Mr. Hume gives the wing of a male as 2·62 inches, and the tail 3·38, tarsus 0·95, and bill at front 0·5 inch. Other specimens are smaller, particularly the young, and the females, he says, are always much smaller than the males. (Septb. 1872.

with paler shafts to the feathers; a second specimen is paler, being slightly olivaceous brown. Wings dull brown, primaries edged with olivaceous white, secondaries with pale rufescent; edge of wing white; middle tail feathers very conspicuously cross barred, the others dark or blackish brown with white tips, the outer edge of the outermost feather is wholly white. Lores, round the eye and the lower plumage white; ear-coverts whitish, tinged with pale ashy towards their tips; sides of neck and breast tinged with bluish ashy; sides of belly, the abdomen and lower wing coverts, with fulvescent, and the tibial feathers are slightly rufescent. Bill brown, basal half of lower mandible whitish; legs fleshy, darker on the toes. Wing 2·05 to 2·1; tail 2·5 to 2·6; tarsus 0·7; bill at front 0·42 inch.

In the third specimen the upper plumage is still paler than in the other two, ashy brownish, and the rufescent on the head very slight; in other respects it is exactly the same. Wing 1·95; tail 2·45 inch, bill and tarsus the same, as in the two previous specimens. The more ashy and little smaller bird is probably the female or young, but I had not determined the sexes.

The birds were very abundant, flying from bush to bush, almost invariably in company with *Chatorhea caudata*, and feeding mostly on the ground between the bushes.

Should this bird be Jerdon's *F. Cleghorniæ*? (Comp. Ibis, 1867, p. 24). It is a trifle smaller than Jerdon's measurements of *Buchanani*, but I can see no very perceptible distinctions between specimens of that bird in the Museum and those from Kachh. Gray gives *F. Cleghorniæ*, in Hand-list, Pt. I, p. 196, as a distinct species, and Blyth says that it differs from *Buchanani* by 'having the upper parts pale rufescent brown.' I dare say a good series of the birds from the N. West Provinces will easily settle this question, but several specimens of *Buchanani*, which I saw from the North-West, are paler than the Kachh birds.

553. Phyllopneuste rama, (apud Jerdon). Not common.

In all birds which I observed, and which are referable to this species, [as distinguished from the smaller *Calomodyta* (? *Iduna*) *agricolensis*, Hume], the first primary was about 0·7 inch. long, but in some birds the third is equal to the fourth, in others the fourth is a trifle longer than the third primary, there is, however, no possibility of distinguishing the birds either by plumage or size. The roundness of the ridge of the bill towards its tip also slightly varies. Wing 2·4; tail 2 to 2·15; tarsus 0·75 to 0·77; bill at front 0·4.

This species is referred to by Gray (Handlist, I, p. 209) as a synonym of *Calamodyta (Iduna) calligata*, Licht., a Siberian and Eastern European species. The identification is very probably correct.

554. Phylloscopus tristis. Not common.

Wing 2·4; tail nearly 1·9, tarsus 0·75; bill at front 0·33, from nostril

0·25; from gape 0·48. Although this specimen slightly differs in size from others, as usually recorded, and although its upper plumage has a decided greenish tinge, it agrees in every other respect with the Indian *tristis*, and not with the European *rufus*; but the difference can scarcely be made out without well preserved examples of the latter species, such as I had occasion to see in Mr. Brooks' collection. Slightly faded specimens of *rufus* are scarcely distinguishable from *tristis*, but I doubt that many specimens of the latter occur without a trace of green tinge in the upper plumage, as represented in Gould's figure in 'Birds of Asia.'

581. SYLVIA (ADOPHANEUS) ORPHEA. Rather rare.

The measurements of two ♂ specimens perfectly accord with those given by Jerdon. Top of head black in both. The outer tail feathers are nearly all white on the outer webs, and also on about the terminal (not basal) half of the inner web.

Gray (Hand-list, I, 214) retains for the Indian species Blyth's name *S. Jerdoni*, as distinct from true *orphea* of Europe, Africa and Palestine. But what are the definable distinctions between these two?

583. SYLVIA (STERPAROLA) CURRUCA. Very common.

Average measurements of four specimens: wing 2·5 to 2·65; tail 2·25; tarsus 0·75 to 0·8; middle toe with claw 0·6 to 0·7; bill 0·36 inch. Comparing these measurements with those of Jerdon, the bill and tarsus are exactly as in *curruca*, but the wing and tail are very nearly as large as in the South Indian *S. affinis*,* and as Blyth says (Ibis, 1867, p. 28) that the latter only differs from the former by a somewhat larger size, and not in plumage, it is, I think, after all not improbable that they represent only one species with slight variations in the size. The amount of white and its purity on the outer tail feathers varies: the latter are nearly all white, or with the basal half of the inner web dusky, and again in others the inner web is nearly to the tip dusky, but the shaft is always black. The white is pure in some birds, but certainly less so in others. The second last tail feathers are generally tipped white, but not invariably. Tristram gives as a 'constant distinction' between the Indian and the European birds, 'the outer tail feathers are nearly all pure white, and the others tipped with pure white' in the former, but these are most decidedly very variable characters, as far as the purity of the white is concerned. Gray (Hand-list, I, 213) does not allow *curruca* in India, but only *affinis*; and Brooks (J. A. S. B., XLI, Pt. II, 1872, p. 81) seems to have no doubt on that point. Before accepting this decision, I should like to see the differences pointed out which exist between *affinis of all India* and *curruca* of Europe

* One of the two original types in the old Asiatic Society's collection has the wing 2·7, and the other 2·75, the bill is slightly larger than in any *curruca* I saw from Northern or Central India.

and Palestine. I can only say that it appears to me far more probable, that all are *curruca*, than that the Northern Indian bird is specifically separable from the European.

589. MOTACILLA MADERASPATENSIS, Gm. Not common.

Wing 3·6 to 3·7 ; tail 3·9 ; tarsus 1 ; bill 0·6. These measurements are somewhat smaller than those given by Jerdon, but the coloration agrees perfectly. A male and female, which I shot on 24th October, had the chin and throat still black, with only very few white feathers intermixed.

591. MOTACILLA DUKHUNENSIS. Common.

♂ wing 3·6 ; tail 3·75 ; tarsus 0·95 ; bill at front 0·5.

♀ „ 3·3 , „ 3·5 ; „ 0·9 ; „ „ 0·5.

These are the measurements of a pair which I shot together on 31st January at Rápúr in the Wagur district. The female is slightly smaller than the male ; it has the ashy above and the black on the wings, on the tail and on the gorget, less pure, and the head above and nape are uniform with the upper plumage, *i. e.*, grey. The white on the forehead is of less extent and less pure. Jerdon's description of *Luzoniensis* is so general that it could equally apply to the present species, which has the white band at the side of neck continuous.

593*bis*. BUDYTES MELANOCEPHALA.

There were few of these birds seen before the end of December. Of several which I obtained, none has a trace of a white or yellow supercilium. Specimens shot in January had the top of head partially brownish grey, some of the feathers, however, changing to black. Chin whitish in front and the breast with some dark spots. About the middle of February I saw a great number of these birds with the underparts very bright yellow, and the top of the head perfectly black.

Wing 3·2, tail 2·75 to 2·9, tarsus 0·85 to 0·95 ; bill 0·45 to 0·5 inch.

Mr. Brooks has kindly shewn me his series of Indian and European *B. flava*, *cinereocapilla* and *melanocephala*, and I can only say that the male adult birds of these species are very well marked and easily distinguished, whatever difficulty there may exist in discriminating young and female birds, or those not in full plumage.

(Comp. Notes on *B. flava* and its varieties, in Ibis, 1871, p. 138, and Brooks in J. A. S. B., XLI, Pt. II, 1872, p. 82).

594*bis*. BUDYTES CALCARATUS, Hodgs. Rare.

A specimen shot on 2nd January near Bhúj agrees in colour with Jerdon's account of *B. citreola* ; the back begins to change from grey to black, which latter colour, according to Brooks, distinguishes *calcaratus* from *citreola* ; the former also has a slightly larger bill and tarsus. The measurements are : wing 3·25, tail 3, bill at front 0·55, tarsus 0·96, hind claw 0·4 inch.

602. Agrodroma campestris. Common.

646. Parus nuchalis.

I shot two specimens during December in the Western part of Kachh, and I saw a few more at various other localities, but the species is decidedly rare. It frequents low jungles, thin and thorny, such as they are in Kachh.

Above, glossy black, somewhat duller on back and tail; nuchal patch, a band about the middle of the wing, extending only to the basal portion of the inner web of the second primary, the extreme tips of all wing feathers, the greater part of the margins of the outer webs of the three or four last primaries, a narrow subterminal outer edge of three or four last secondaries, the broad outer margins, also involving the tips of the tertials, the first outer tail feather entirely, the second nearly so (except on shaft and on the edge of inner web), the outer web of the third last, and the tips of all the succeeding feathers, (decreasing to the centre one), white. A broad black band from the lower mandible along the centre of the underside to the abdomen, broadest in front and on breast. Sides from the angle of the mouth to the lower tail coverts including white, on the side of breast, the belly and abdomen, tinged with very pale but distinctly fulvous green. Tibial feathers white in front, black behind; some of the longest lower tail coverts are blackish at the base of the inner web, the remainder all white. Wing 2·7 to 2·75, tail 2·1 to 2·25; tarsus 0·65; bill at front 0·35. Bill black; legs plumbeous, very stout.

This is probably the most northern part of the country in which the species occurs. The two specimens above described slightly differ in size and coloration from Jerdon's description and figure of a South Indian example, but both evidently are the same species.

663. Corvus (Anomalocorax) impudicus; Hodgs.

This name is adopted by G. R. Gray (Handl., II, 14) for the Indian crow, *C. splendens*, Tem., being referred to Java and Sumatra. It is the only representant of the *Corvidæ*, but is very common throughout Kachh.

684. Acridotheres tristis. Very common.

In several places I saw this species associating at dusk in great numbers near tanks where there was high grass growing, and at night fall they disappeared under a tremendous noise like shooting stars in the arundinaceous forest, with the peculiar rapid turn in their flight, exactly as *Sturnus vulgaris* does in Europe.

The entire plumage is much duller in winter than in summer, and is exactly like that of *A. fuscus*. The first primary is minute and the fourth the longest. In one specimen, the second primary is entirely white, and some of the first tertials are also white. This is evidently an accidental

variation in the plumage, perhaps the first step to albinism. The wing varies in four specimens from 5·5 to 5·9; tail 3·5 to 3·75; tarsus 1·4 to 1·6; bill at front 0·65 to 0·7 inch.

685. ACRIDOTHERES GINGINIANUS.

Not very common, except locally in the eastern parts of Kachh (Wagur district). In young specimens from Bengal the bill is blackish green at base, the wing spot pure white and the under tail coverts and tips of tail feathers dusky white, intead of pale ferruginous.

In addition to the three species, given by Jerdon, G. R. Gray (Handl., II, 20) separates *A. grandis*, Hodgs. = *cristatellus*, Vig., from Nepal, and *? ater*, V., = *griseus*, Blyth (part), from Pondicherry.

687. TEMENUCHUS PAGODARUM.

Rare. I have seen it only on three or four occasions in pairs. Jerdon's description is rather short. It should state that the lengthened brown feathers pass round the whole neck. The two middle tail feathers are ashy brown, and blackish along the shafts, the remainder dark brown, tipped with white, the latter colour increasing in amount towards the outer feathers; lower tail and under coverts of the wings white, tibial feathers ashy white; there is a small black spot at the base of the lower mandible, and the chin quite in front is also tinged blackish.

690. PASTOR ROSEUS.

Very common from about the middle of November. G. R. Gray (Handl. II, 19) quotes the Indian bird as distinct from the European and Western Asiatic under the name *P. ? peguanus*, Less. I do not know whether a second species exists in Barma, but surely the Western Indian bird is not different from the European one, which in former years I had very abundantly seen in various parts of Hungary. It is a rare bird in Western Europe.

694. PLOCEUS BAYA.

This is the smaller bird,* described by Jerdon under the above name. Although nests were very numerously seen on branches overhanging river banks &c., the birds themselves were very rare; most of them must have retired to some other more wooded districts, but they are said to return in the rainy season, when they breed.

703. MUNIA MALABARICA.

Extremely common. I found the species breeding abundantly during November, December and January in deserted nests of the weaver bird, *P. baya;* and I was told by my shikari that the *Munia* never builds its own nest, always using that of *baya*, as soon as the latter had finished breeding at the end of the rains. However, I have at least on two occasions seen a *Munia* working on an imperfect nest of the *P. baya*, evidently the birds

* Comp. ante, p. 167.

were repairing it. There certainly were other apparently finished nests with eggs in them, their bases were rather flat, irregular and the entrances were lateral; these looked to me as nests repaired by *Muniæ*. I found from 6 to 12 eggs in one of them; more than one pair appeared to lay in the same nest, or rather the birds did not seem to be very particular in which nest they lay; they appear to be very communistic in this respect. The eggs are white, varying in shape from elongately oval to almost globular. The former is the prevalent type, averaging in size about 16 by 12 (changing to 11 and 13) m.m.; one of the extreme forms of the globular type measures 19 by 17 m.m.

706. PASSER INDICUS. Very common.

I have seen the wing of this species in India vary from 2·75 to 3·25 inch. I wonder, if really good series of the European and the Asiatic sparrows were made, whether it would be possible to define in words the distinction between *indicus* and *domesticus*; I doubt it.

711. FRINGILLA (GYMNORIS) FLAVICOLLIS. Common.

The bill of this species certainly more resembles *Fringilla* than *Passer*, and so does the habit, the call, and the general tone of plumage of the bird.

714*bis*. FRINGILLARIA* STRIOLATA.

Comp. Hume in Ibis, 1870, vi, p. 399.

Local and usually seen in pairs, between low bushes on slightly elevated or hilly ground.

♂ wing 3·1; tail 2·35; tarsus 0·63; bill at front 0·36 inch.
♀ „ 3; „ 2·3; „ „; „ „ „ „ „.

This bird was only lately added to the Indian fauna by Mr. Hume. Kachh specimens perfectly agree with Mr. Hume's account.

716. CITRINELLA† (GLYCYSPINA) HUTTONI. Very common.

Males have the head lighter ashy than females; and in both sexes the feathers on top of it are slightly darkened along the middle line. The males are also more rufous below, having a broad patch of that colour on the breast. A dark streak from the base of the lower mandible on each side is well marked in both sexes, and the pale mandibular streak has a slight yellowish rufescent tinge. I cannot help doubting the specific distinctness of this bird from *hortulana*, as far as I remember the European bird. The note of both is exactly the same.

756. MIRAFRA ERYTHROPTERA. Not common.

I shot once a specimen sitting on a bush about 5 feet high, and pouring forth a rather pleasing song.

* The species of this genus are almost entirely African, the present species appears to be the most eastern straggler.

† The generic name *Emberiza* has been restricted for the type *E. nivalis*, L., therefore nearly all Indian *Emberizinæ* are referable to *Citrinella*.

758. Ammomanes phœnicura. Common.

Wing 4 to 4·3 ; tail 2·3 to 2·5 ; tarsus 0·8 to 0·86 and bill 0.5.*

760. Pyrrhulauda grisea. Common.

Gray (Handl. II, 123) gives *affinis*, Blyth, as a distinct species from 'Madras.'

761. Alauda (Calandrella) brachydactyla. Common.

Wing in three specimens only 3·6 to 3·7 inch, tarsus 0·75 to 0·8.

765. Alauda (Spizalauda) deva. Very common.

The measurements agree with those given by Jerdon, the length of the wing only varying between 3·3 and 3·4 inch. Mr. Hume (Journal A. S. B. xxxix, pt. ii, p. 120) separated a very closely allied and slightly smaller form as *Sp. simillima.* The length of the wing of the Kachh lark is intermediate between his measurements (loc. cit.) of the two forms ; and so also appears to be the general tone of the plumage, not being either particularly rufous, nor pale or sandy colour. The lining of the wing is slightly tinged with rufous in a young, but is of a purely fawn or sandy in two adults. The male has the hind toe and claw 0·8, the female 0·7, the former has also the feathers of the crest somewhat longer than the latter.

770. Certhilauda (Alæmon) desertorum.

Wing 5·1 to 5·3 inch. Jerdon does not mention the dark mustachial streak which is always well marked. All my specimens have the upper plumage brownish sandy-grey, exactly like those obtained by Mr. Blanford in Abyssinia, while Jerdon noticed an Indian example with dark plumage, probably resembling Gould's figure in Birds of Europe. They are evidently the same birds. (Comp. Blanford, Geol. and Zool. Abyssinia, 1870, p. 385). Gray (Handlist, II, 121) gives Finsch's *Jessei* as distinct from *desertorum*, although their identity has been, I believe, unquestionably proved by Finsch himself (vide Append. II, to that author's Report on birds from Abyssinia, &c., p. 316).

I have obtained this desert lark only on the Rann, between the mainland of Kachh and the islands of Pacham, Kharir, &c., but even in these true desert localities it seems to be rare ; for I have not seen more than a dozen examples altogether ; generally two of them in society were seen busily hunting after grain on the soft, muddy track, leading through the Rann.

788. Columba intermedia. Very common.

There is scarcely a well in Kachh in which a colony of these pigeons would not breed, and they appear to do this all the year round, as if domesticated.

794. Turtur cambayensis. Very common.

796. „ risorius. Very common.

* The numbers referring to these two last measurements are evidently transposed in Jerdon's book, loc cit. p. 422.

797. TURTUR HUMILIS. Common.

799. PTEROCLES ARENARIUS.

This is by no means a common bird in Kachh. I only met with it in the south-eastern parts of the province on large grassy plains or fields.

800. PTEROCLES FASCIATUS. Very common.

The crepuscular habit of this bird must be explained by its coming to drink at, or little after, dusk. Hundreds of them used to arrive, under a loud chuckling call, to the wells or tanks where I was usually encamped. After they had satisfied their thirst they generally walked away quietly and remained for the night in the neighbouring fields, although they were often constantly alarmed by other animals who came to the wells during the night. When flushed for the first time in the jungles during the day, they generally take only a short flight and drop down again, but when flushed a second time they betake themselves a much greater distance. On the 22nd December, I came across a couple of old birds with 3 young ones, only about one or two days hatched. This must have been exceptional, as the usual breeding season of these birds is much earlier, during the rains.

802. PTEROCLES EXUSTUS. Very common.

Comp. Journ. A. S. B. xxxviii, pt. ii, p. 189.

In many females the central rectrices are quite as much elongated as in the males, at least during the winter. A young male shot in November is coloured above like the female, but the chin is whitish, the pectoral band altogether absent, and the sides of the abdomen are nearly as rufous brown, as in the adult male.

803. PAVO CRISTATUS. Very common.

The sacred bird of the Thakurs of the country.

818. FRANCOLINUS VULGARIS.

♂. Wing 6·3, tail nearly 4, tarsus 1·75 inch.; ♀ a trifle smaller. Out of eight specimens none has the wing under 6 inch. The birds are larger than usual, and though generally distributed, they are not common, and solitary. I shot two or three in the Wagur district, but have not seen nor heard through the whole of Kachh of a different kind of black partridge, as indicated by Capt. McMurdo and Mr. Hume, (comp. Journ. A. S. B. vol. xxxviii, pt. ii, p. 190 and vol. xxxix, pt. ii, p. 121); and I can only conclude that Capt. McMurdo was misled by the size of the bird, so as to regard it as a different species. To what species Mr. Hume's bird belonged, it is really difficult to say.

They generally roost on low trees.

822. ORTYGORNIS PONTICERIANUS. Very common.

♂. Wing 5·5 to 5·75, tail 3·3 to 3·6, tarsus 1·4 to 1·5.*

The wing in two females in 5·25 and 5·5 inch, they have the throat distinctly tinged with ferruginous, while in the males it is almost quite

* Jerdon says 'not quite 2″'!

white. This partridge is extremely common throughout the country, it is quite a homely bird and often enters houses. It invariably roosts on trees, particularly on the Kundu, two or three generally sitting together on a branch between a thick cover of foliage. It generally goes to roost shortly after sunset.

827. Perdicula asiatica. Not common.

All the feathers of the upper plumage have in the male one, or generally two, tawny spots along the shafts, bordered with dark.

829. Coturnix communis. Local.

832. Turnix taigoor. I have seen and shot this quail only on two occasions, they were solitary males.

836. Eupodotis edwardsii. Not common. (The bustard of Europeans).

837. Houbara Macqueenii. Common, and though generally distributed, it is most abundant in the eastern and southern portions of Kachh.

839. Sypheotides auritus. The florican is not found during the winter, but is very abundant during the rains.

840*bis*. Cursorius Jamesoni, Jerdon, ? = gallicus. Very common.

Wing 6·3 to 6·75, tail 2·4 to 2·7, tarsus 2·1 to 2·3, bill at front 0·8 to 1 inch. In the young the whole of the upper plumage is isabelline, crossed by somewhat undulating dark lines or narrow bands, and the black wing feathers are margined towards the tips with pale; the lower plumage is generally albescent throughout, pale isabelline on breast and with a few brown cross lines. The first change is indicated by the appearance of the white occipital band, then comes the ashy on the occiput, then the lower black band from behind the eye, and at last the cross black band, separating the ashy from the white on the hind occiput. As this gradual change in the occipital bands takes place, the brown lines on the other plumage are gradually disappearing, and young birds shot in January still had them on the wing coverts and on the vent, but somewhat later every trace of the brown lines disappeared, and in the adult the isabelline plumage has a conspicuous rufescent tinge on forehead, hind neck, scapulars and on the upper side of the tail.

I have no specimen of the European bird to compare, but as far as I remember it from having often seen it in former years in Southern Hungary, it strikes me that the flight and the habits of *C. gallicus* are somewhat different. The Indian bird appears to be more solitary, its flight seems to be slightly heavier, and the voice more shrill.

849. Ægialites curonicus. Common.

Gray (Handl., III, 15) gives *curonicus*, Besck, as synonym of *fluviatilis*, but quotes *Philippinus*, Lath.) from India.

852. Chettusia ? gregaria. Very common in open country, and often seen with *Cursorius*.

Winter plumage: Forehead and superciliary band passing round the occiput white, the former slightly, the latter distinctly tinged with rufous; top of head impure blackish brown; back of neck pale rufescent ashy, many of the feathers being usually tipped pale; general plumage above slightly olivaceous ashy brown, somewhat darker on the rump; primaries black, secondaries white, tertials olivaceous, the last feathers much lengthened; upper tail coverts white; tail white, with a black subterminal band, not extending on the outermost feathers. Lores white, with the shaft of the feathers black and the nude terminations somewhat prolonged; a narrow blackish streak through the eye; ear coverts, and sides of neck slightly rufescent brown, passing on to the breast, on which most of the feathers are subterminally darkened, forming subtrigonal marks. Chin, throat, and the whole lower side from beyond the breast, including lower wing and lower tail coverts, pure white. Wing 8 to 8·3; tail 3·5 to 3·7; tarsus 2·2 to 2·3; bill at front 1·1 to 1·2.

Gray (Handlist, III, 11) adopts the name *Wagleri* for the Indian bird, but I do not know in what our bird differs from the European *gregaria.* A comparison of authentic specimens is needed.

855. Lobivanellus indicus, (Bood.) Very common.

G. R. Gray, (Hand-list, III, 11,) gives *L. indicus*, Bodd., = *goensis*, Gm., = *atrogularis*, Wagl. Wing 8·5 to 8·9; tail 4·25 to 4·75; tarsus 2·75 to 2·9; bill at front 1·2 to 1·3 inch. It generally keeps near villages about tanks and wells. At the first dawn its characteristic call is heard and repeated all round the habitations.

856. Sarciophorus bilobus. Very common.

Average measurements of six specimens, shot in December and January. Wing 7·7 to 8, tail 3·1 to 3·3, tarsus 2·3 to 2·5; bill at front 1·1 to 1·2 inch. The black of the top of head is in winter generally mixed with greyish brown, and in younger birds it is almost entirely brown; the chin in the young is whitish, while in adults apparently it is in winter much mixed with black.

Gray (Hand-list, III, 12) gives *Hoplopterus Brissonii*, Wagl. = *bilobus*, Aliq. = *ludoviciana* var *β.*, Lath., from India; and *H. (Lobipluvia) malabaricus*, Bodd., = *bilobus*, Gm. = *myops*, Less., from Malabar. If the latter reference applies to our bird, it has in that case to stand as *malabaricus*, which would not be a very appropriate name for it.

859. Œdicnemus indicus, Salvadori. Common.

Comp. Att. R. Acad. Sc. Nat. 1866, viii, and Ibis, 1866, II, p. 415.

Average measurements of six specimens: Wing 8·5 to 8·8; tail 4·25 to 4·5; tarsus 2·8 to 3·3, bill at front 1·45 to 1·65 inch. The bird is called *Chackua* by the natives.

Gray (Hand-l., III, 9) questions the distinctness of *indicus* from

crepitans of Europe; it certainly barely differs; the nude space behind the eye is in the European bird of less extent, than it is in the Indian.

863. Grus antigone. Tolerably common.

A sacred bird with the Mahomedans, who will not kill a *Saras*. It is almost always seen in pairs.

865. Grus cinerea. Common.

About the beginning of February the birds collected in very large flocks, and by the middle of that month nearly all of them were gone, only solitary and probably sickly birds remaining.

871. Gallinago scolopacinus.

As there are very few swampy grounds, the bird is of course very rare. I have not seen more than about a dozen pairs. One has the wing 5·2, tail 2·2, tarsus 1·3; middle toe with claw 1·5; bill 2·9 inch. The shorter lower wing coverts are white with blackish bars and the longer ones grey with white edges, which in *G. stenura* are replaced by white and dark bars.

875. Limosa ægocephala. Very common.

All the specimens I shot had the white of the face round the bill, extending over a portion of the superciliary band, tinged with golden. It is a very restless and quarrelsome bird, whenever two of them meet each other on the edge of the water. Before the end of October few birds were seen, but they became plentiful about the middle of November. In February none had yet changed their winter garb.

880. Philomachus pugnax. Very common.

Male: wing 7·3 to 7·7; tail 2·25 to 2·6; tarsus 1·8 to 2; middle toe with claw 1·6; bill at front 1·3 to 1·4. The general tone of the upper plumage above is ashy brown, the wing coverts are uniform dark brown, more or less tipped with white, but not barred. Bill blackish, more or less variegated with yellowish fleshy at the base.

In the female the general tone, above, is slightly richer, all the pale coloration having a faint rufescent tinge. In other respects both sexes are exactly similarly colored, all the feathers of the upper plumage being darker about the centres. Her bill is black and the feet greenish black. Wing 6·15; tail 2·2; tarsus 1·55, mid toe with claw 1·4; bill at front 1·2 inch.

I have seen them generally feeding in company with pigeons near places where grain was collected after the harvest.

885. Tringa Temminckii. Not common.

891. Actitis glareola. Very common.

Specimens, shot in December and January, have the longer upper and lower tail coverts with dark blackish cross bars, the latter besides streaked with the same colour along the shafts. The outermost tail feathers as a rule have some dark spots on the outer webs.

892. A. OCHROPUS. Very common.

The outermost tail feathers have as a rule a minute subterminal dark spot on the outer web, and the same applies to the longest upper tail-coverts.

893. A. HYPOLEUCUS. Very common.

894. TOTANUS GLOTTIS. Very common.

Average measurements of four specimens: wing 7·2 to 7·8; tail 3·2 to 3·4, tarsus 2·4 to 2·6; bill at front 2·1 to 2·2 inch. Most of the upper tail coverts have dark cross bars, like the tail. There is a dusky streak from the base of the upper mandible towards the eye, superseded by a pure white band. Outer web of first minute primary and the shaft of the second, the longest one, white.

896. T. FUSCUS. Very rare.

The middle tail feathers have in a specimen distinct dark cross bars along the margins of both webs. First long primary with a white shaft, all are towards the margins of the inner webs minutely variegated with white and dusky brown.

897. T. CALIDRIS. Rare.

Wing 6·5, tail 2·5, tarsus 2·1, bill at front 1·8 inch. The first long primary has a white shaft, and all are albescent on the margin of the inner web; lower tail coverts more or less streaked or spotted with dusky; breast cinereous, all feathers dark-shafted.

898. HIMANTOPUS INTERMEDIUS, Blyth. Very common.

The birds with brownish back and scapulars, blackish hind-head, and with a grey neck, are young. In some specimens the whole neck is white and the occiput black. One adult male, shot in February, had the whole head white, somewhat dusky behind the eye, on the occiput and a little lower below the occiput pure black, then purely white, back and wing glossy greenish black, rump white, tail ashy; below entirely white. It is difficult to imagine what the specific distinction should be between such a bird and, for instance, Gould's figure of *H. autumnalis*, Hasselq. = *melanopterus*, Tem., in 'Birds of Europe.' Gray (Hand-l., III, 47) quotes *H. candidus*, Bonn., as synonym of the European *autumnalis*, reserving Blyth's name *intermedius* for the Indian bird, but I do not think that the question as to the specific distinctness of the two can be considered as settled.

As regards size I found in Kachh specimens the following variations: wing 9 to 9·7; tail 3·2 to 3·3, tarsus 4·25 to 5·3; bill 2·5 to 3 inch.

899. RECURVIROSTRA AVOCETTA. Not common.

In what appear to be rather young birds the dark upper coloration is mixed with brown, and the short wing coverts are mostly pale brown. An adult in full plumage, shot at the beginning of January, measures: wing 9·3, tail 3·5, tarsus 3·7, bill in a straight line from front to tip 3·35, this

being equal to the length of lower mandible from chin to tip, measured along the curve.

901. HYDROPHASIANUS SINENSIS.

I have seen only a few specimens on the larger lakes. The species breeds in Cashmir.

903. FULICA ATRA.

Is generally only seen on the larger lakes. One, rather a large specimen, measures: wing 8·6, tail 2·3, tarsus 2·5, mid toe with claw 3·8, bill to base of disk 1·9, from gape 1·5, height of bill at base 0·7. The bird is evidently an old one, it was one of a pair; the plumage in the middle of the breast is conspicuously mixed with white; the extreme edge of wing is white and the secondaries albescent.

923. ARDEA CINEREA. Not common.

There is a great deal of pure black at the sides of the base of neck and of the anterior breast, extending on either side to the middle of the abdomen, in other respects the plumage agrees with Jerdon's description which is of course that of the winter garb.

926. HERODIAS INTERMEDIA, v. Hasselquist, = EGRETTOIDES (Tem.).

Very common. Wing 13, tail 4·75, tarsus 5, mid toe with claw 3·75; bill at front 3·5 inch. Comp. G. R. Gray, Handl. III, 28.

927. H. GARZETTA.

Rare, and while the former species is usually seen near tanks, the present one prefers streams, and appears to be more solitary. Wing 11·25, tail 4·25, tarsus 4·25, mid toe with claw 3, bill at front 3·65 inch. This specimen was shot on 21st February; it had the occipital crest not fully, but the dorsal train and lengthened pectoral feathers well developed.

928. DEMIGRETTA SACRA, Gmel., = ASHA, Sykes. Not common.

Comp. G. R. Gray, Handl. III, 28.

In a couple of young birds, with brownish ashy plumage and white on the throat and winglet, the wing is 10·75, tail 3·5, tarsus 3·9, mid toe with claw 2·8, bill at front 3·5 inch.

929. BUPHUS COROMANDUS. Very common.

Birds shot on 19th December (*i. e.* in the middle of the winter months) had the upper head tinged golden, and a few golden occipital crest feathers about one inch in length. Wing 9·75, tail 3·5 to 3·8, tarsus 3·5, mid toe with claw 2.75, bill at front 2·3 to 2·4, the same from gape 3·2 inch.

930. ARDEOLA LEUCOPTERA. Not common. Wing 9 and tail 3·5 inch.

931. BUTORIDES JAVANICA. I have only seen, and shot, a solitary specimen, with the pale triangular spots on all the wing coverts.

937. NYCTIARDEA NYCTICORAX, L. = *Nycticorax griseus.*

Is also decidedly rare in Kachh. I have seen only a few specimens in the plumage of the young, which in general tone is very like that of the

previous species, but without the strong metallic lustre. One measures: wing barely 11 inches, bill 2·5, the other measurements exactly agree with those given by Jerdon.

938. TANTALUS LEUCOCEPHALUS. Very local, and a shy bird.

An apparently old specimen, but with a broad dark brown band (the feathers in it being, however, tipped white) across the hind breast, shot on 8th February, measures: wing 21·5, tail 7, (the longer lower tail coverts being very much lengthened, soft and decomposed), tarsus 10, mid toe with claw 5·2; bill at front 11 inch.

939. PLATALEA LEUCORODIA. Rare.

941. THRESKIORNIS MELANOCEPHALUS.

The single specimen seen, and shot in December, has the entire plumage white, merely the lengthened tertials are pale silvery ash towards their terminal halves. Measurements the same as those given by Jerdon.

942. GERONTICUS PAPILLOSUS. Very common.

The bill of this species is slenderer, but not longer than that of the last.

944. PHÆNICOPTERUS ANTIQUORUM, Temm.

Comp. Gray in Ibis, 1869, v, p. 441.

I saw only two or three flocks of this species at some large tanks in the Wagur district, young and old birds associating.

952. DENDROCYGNA ARCUATA. Rare.

957. SPATULA CLYPEATA. Very common.

There was scarcely a pool of water to be met with without a few of these birds on it.

961. CHAULELASMUS STREPERUS. Very common.

On the 1st November, I met with six half grown ducks on a small lake near the village Dhosa. I shot one, but unfortunately did not preserve it. At the time I had the impression that I shot a young gadwall, and certainly it could only have been either this species, or *Anas boschas* which I saw on the same lake; but I rather think it was the former. I did not know at the moment that the breeding of the gadwall had not been recorded in India.

962. DAFILA ACUTA. Common.

964. QUERQUEDULA CRECCA. Very common.

968. AYTHYA FERINA. Rare.

An apparently young female with the upper plumage as in the old, but with the whole of the underparts dull white mixed with pale brown, tinged rufous on chin, neck and breast, and of a somewhat darker hue on the vent, measures: wing 8, tail 2, tarsus 1·45, mid toe with claw 2·6, hind toe with claw 0·75, bill from gape 2 inch.

969. AYTHYA NYROCA. Rare.

971. FULIX* CRISTATA. Not common.

975. PODICEPS MINOR? = PHILIPPENSIS, Bonn. = *minor*, var. *β.*, Gm. Very common.

Wing 4 to 4·25; tarsus 1·3 to 1·4, mid toe with claw 2, bill at front 0·7 to 0·8, from gape 1·1 to 1·2 inch.

980. LARUS (CHROICOCEPHALUS) BRUNICEPHALUS.†

Not common, except along the coast and locally in the Rann. The respective measurements of two specimens are: wing 12·3 and 13·4, tail 4·4 and 4·8; tarsus 2 and 2·22; mid toe with claw 1·65 and 1·8; bill at front 1·3 and 1·5; from gape 2·2 and 2·6 inch. The iris is chocolate brown, bill yellowish, black towards tip; feet yellowish brown. The quills are black; except towards the base, and beginning with the fourth all have a small white tip, gradually increasing in extent on the succeeding feathers. Both specimens, although somewhat small in size, agree perfectly in coloration, which does not appear to differ from the winter plumage of this bird, as usually recorded.

983. GELICHELIDON NILOTICA, Hasselq., = *anglica*, Mont.

Local, and not common, except on or along the Rann. Average measurements of three birds, with the loreal region blackish, the occiput and top of head ashy white, and the grey primaries externally tipped darker on *both* webs: wing 11·2 to 11·8; tail 4·5 to 4·8; tarsus 1·3 to 1·35; mid toe with claw 1·15; bill at front 1·35 to 1·5 inch. Iris, feet and bill entirely black.

984. HYDROCHELIDON INDICA.

I saw a considerable number of these birds on the tanks in the Rann islands, Pacham and Kharír, but scarcely any on the tanks in Kachh proper. Iris and bill in fresh specimens black‡; feet blackish brown.

1005. GRACULUS CARBO. Not uncommon on the larger lakes.

1007. GRACULUS (MICROCARBO) MELANOGNATHUS, Brandt.

G. R. Gray (Handl., III, 129) gives *javanicus* of Horsfield as a synonym of the above, but he allows *niger*, Vieillot, as a distinct species from 'S. Asia.'

1008. PLOTUS MELANOGASTER.

I met with only solitary specimens of both this and the preceding species.

* *Fulix*, Sundev., 1835 = *Fuligula*, Seph., ex parte; vide G. R. Gray, Handl., III, 86.

† Gould has besides this and *ridibundus* a new species, named *Tibetanus*.

‡ In dried specimens the bill has distinctly a reddish tinge.

Postscript.

While the preceding pages were passing through the press, I received from Dr. W. de Tatham at Bhúj a few additional specimens of mammals and tortoises, of which I had not been able to obtain examples at the time of my visit. They are—

Pteropus medius, mentioned at p. 223. The specimen sent agrees in all essential points of structure and coloration with those from other parts of India; it has a total length of about 11·5 inches, which is very nearly the length of the middle finger; the ears are 1·2 inch long and only 0·7 inch broad, while in other specimens from India the ears generally have a greater breadth. Most of the Indian specimens also have a considerably longer middle finger.

Erinaceus pictus, see p. 223. An adult specimen of this species is 6·5 inches long; in coloration it exactly agrees with the half grown one from which my description was taken, except that the lower belly is less brown, the white extending to nearly within the interfemoral space. In the younger specimen the dentition is normal, agreeing (according to Owen's Comparative Anat. and Phys., III, p. 308) with that of *E. europæus*, the formula being $i.\ \frac{3\,3}{3\,3} + c.\ \frac{1 \cdot 1}{0\,0} + p.\ \frac{3\,3}{2\,2} + m.\ \frac{3\,3}{3\,3} = 36$. The two anterior incisors are very far apart and have the form of canines of *Carnivora*, the third on each side is very much larger than the second, which again is considerably smaller in the upper than in the lower jaw. What is considered as a canine in the upper jaw, is by other Osteologists often accepted as the first premolar. The true first premolar in the upper jaw is smaller than the canine, the second premolar is minute, and in the adult specimen it is altogether absent, it has probably become obsolete; the last premolar is tricuspid in upper and bicuspid in lower jaw; the formula of the adult dentition would, therefore, appear to be $\frac{3\,3}{3\,3} + \frac{1\,1}{0\,0} + \frac{2 \cdot 2}{2 \cdot 2} + \frac{3 \cdot 3}{3\,3} = 34$, but there is a short space visible between the two premolars in the upper jaw, while the first premolar is very close to the canine.

Of tortoises Dr. Tatham sent me a specimen of the *Testudo*, mentioned in my notice* on the Reptiles of Kachh; it proved to be *T. elegans*, Schoef, as recorded by Günther, or *Peltastes stellatus*, (Schweig.), according to Gray. (Suppl. to Cat. of Shield Rept., 1870, p. 8).

The *Emyda* referred to in the same notice is, Dr. Anderson informs me,

* Proceedings for May, p. 72. By an error, I stated that the species, which was described to me by a native, is like *T. Grayi*, which specific name should be *Leithii* of Günther.

most probably *vittata* of Peters. He sent a drawing of a middle-aged specimen to Prof. Peters, who says that there is no distinction traceable between the figure of the Kachh specimen and the type of *vittata.* The head, above, is spotted with dark, and the entire carapace is marked with very numerous irregularly radiating dark streaks. The granulation of the carapace becomes apparent after the epidermis has dried up, in fresh specimens no trace of it is to be seen. Young specimens are rather flat, but in old ones the convexity of the carapace is very considerable, and the shell is somewhat depressed along the centre. The species is common both in rivers and tanks, and is often met with crawling from one pool of water to another; I have seen specimens up to a length of 15 inches. One, recently received, has the carapace 10·5 inches long, and 7·7 broad across the abdomen; and the total height is nearly 3·5 inches. The odd osseous antero-central plate of the sternum is broadly rounded, somewhat narrower in front than behind, 1·3 inch long and 1·5 inch broad; the two posterior plates form a suture, 2·3 inch long, they are perfectly united, as in *E. Ceylonensis*, which has a quite similar coloration, and to which *vittata* is united by Gray in Shield Rept., 1870, p. 117.

Notes on Fish, collected by Dr. Stoliczka in Kachh,—*by Surgeon Major* F. Day.

[Received 26th June, read 3rd July, 1872.]

I am indebted to Dr. Stoliczka for the following eighteen species of fish with their local names, collected by him during his recent tour through Kachh. They are interesting as extending our knowledge of the localities to which species spread, and also as first demonstrating the existence of the Genus *Cyprinodon* in the fresh waters of India.

Fam.—Gobiidæ.

1. *Gobius giuris*, Ham. Buch. *Kharba* Mah. *Tulli*, Kachh.

Five specimens up to 6 inches in length.

The inferior pharyngeal bones are each of a triangular shape, the base being external, whilst the two bones are closely approximated together along nearly two-thirds of their internal margins.

Fam.—Ophiocephalidæ.

2. *Ophiocephalus punctatus*, Bl. *Dhor*, Kachh; *Dhaka* by foreigners.

Fam.—Cyprinodontidæ.

3. Cyprinodon Stoliczkanus, sp. nov.

B. III, D. 1/8, P. 17, V. 7, A 2/7, C. 15, L. l. 27, L. tr. 8.

Length of head 1/4, of caudal 1/5, height of body 1/4; of dorsal and anal fins 1/3, (in the males), about 1/8 in the females, of the total length. *Eyes:*

diameter 1/3 of length of head, 1 diameter from end of snout, and $1\frac{1}{2}$ diameters apart. Head thick, snout somewhat obtuse, upper jaw rather protractile. *Teeth* in a single row, compressed, tricuspid. *Fins:* dorsal, in the males, commences midway between the middle of the eye and the base of the caudal fin, opposite the ninth scale of the lateral line, whilst in the females its origin is between the opercle and the base of the caudal, but still opposite the 9th scale of the lateral line. In the males the dorsal and anal fins when laid flat reach the base of the caudal; the anal commences below the last dorsal ray. Caudal lunate, its outer rays being slightly produced. The ova are exceedingly large, almost equalling the diameter of the eye, of the same size as in *Haplochilus panchax*, H. B. The length of the intestinal canal equals about three times that of the abdomen. *Colours:* male, yellowish green, reticulated with brownish green, a small black spot on the shoulder behind the opercle; dorsal fin spotted, anal more sparingly so; caudal yellowish with a crescentic black band in its outer third, and a second less wide (but still broader than the ground colour) between the outer one and the root of the caudal fin. Female, silvery, with about nine vertical black bands extending from the back to the abdomen. Out of 28 specimens the largest is 1·6 inches in length; they were obtained in a small nearly quite fresh-water stream at the village Joorun, and also at Lodai, along the edge of the Rann.

4. *Haplochilus rubrostigma*, Jerdon. I found this species likewise in the fresh waters of the hills between Sind and Bilúchistan.

Fam. CYPRINIDÆ.

5. *Discognathus lamta*, Ham. Buch. *Malék*, Kachh.

6. *Labeo calbasu*, Ham. Buch. *Dai*, Kachh.

Out of five specimens three have D. $\frac{3}{13}$, and in the majority the length of the head is 1/5 of that of the total length. This fish is found in Sind, and I have also taken it at Jabalpúr in Central India &c.

7. *Labeo boggut* Sykes. *Loi*, Kachh.

B III. D. 2/9, P. 17, V. 9, A. 2/5, L. l. 60—65, L. tr. $12\frac{1}{2}$/15.

Length of head 2/11, height of body 2/5 of the total length. *Eyes:* diameter 2/9 of length of head, $1\frac{1}{2}$ diameters from end of snout and 2 diameters apart. Snout thick and somewhat projecting beyond the lower jaw, having a small lateral lobe. Interorbital space convex. A small maxillary but no rostral barbel. Lower lip fimbriated, sometimes having a distinct inner fold; pores on the snout in some specimens. *Fins:* dorsal commence somewhat in advance of the ventrals, and nearer the end of the snout than the root of the caudal. *Lateral line:* eight to nine rows of scales between it and the base of the ventral fin. *Colours:* silvery, darkest superiorly, occasionally a series of light vertical bands descend along the middle of the side; fins orange.

Several specimens up to 6 inches long from Kachh; others from Púna and Jabalpúr, where it was termed "Kolees," as stated by Sykes; and one specimen in the Calcutta Museum came from Nágpúr.

Very probably this species may prove to be identical with *Tylognathus striolatus*, Günther, which is stated to have come from Púna.

8. *Cirrhina mrigala*, Ham. Buch. *Moraka*, Kachh.

Snout tuberculated; length of head 1/5 in the total length; five specimens up to 8 inches in length.

9. *Cirrhina bata*, Ham. Buch. *Tchirri*, Kachh.

Several specimens up to 6 inches in length.

10. *Cirrhina dero*, Ham. Buch.

B. III. D. 3/9, P. 19, V. 9, A. 2/5, C. 19, L. l. 39, L. tr. $7\frac{1}{2}/7$.

Length of head 2/11, of caudal 1/5, height of body 1/5, of dorsal fin 1/6 of total length. *Eyes* rather high up, diameter 1/5 of length of head, $1\frac{1}{4}$ diameters from end of snout, and 2 diameters apart. *Maxillary barbels* minute and concealed in the groove. Snout rather overhanging the mouth and having some open glands across it. Lower jaw the shorter, with a ridge above the symphysis. *Fins:* dorsal commences midway between the end of the snout and the posterior border of the base of the anal fin, its last ray divided to the root, its upper border very concave, the anterior two and the last ray being elongated; pectoral rather shorter than the head, and not reaching so far as the ventral; caudal deeply forked, its lobes being of equal length. *Scales:* $5\frac{1}{2}$ rows between the lateral line and the base of the ventral fin. *Colours:* greyish superiorly as low as the row of scales above the lateral line, wherefrom it becomes silvery white. Several specimens up to 6 inches long. I also obtained two others in Calcutta.

I should have hesitated identifying this fish with Hamilton Buchanan's merely from the engraving; for that shows very long barbels, but is otherwise correct, even to the relative proportions, but in the text he observes "at each corner of the mouth is a minute tendril."

11. *Barbus sarana*, Ham. Buch. *Popri*, Kachh.

12. *Barbus ticto*, Ham. Buch. *Phiari*, Kachh. No black spot at the commencement of the lateral line; dorsal and anal fins tipped with black.

13. *Barbus stigma*, Cuv. and Val. Very numerous.

14. *Barbus vittatus*, Day. Twelve specimens up to 1·5 of an inch in length. The last undivided dorsal ray is articulated.

15. *Nuria danrica*, Ham. Buch.

16. *Rasbora daniconius*, Ham. Buch. *Jonir* or *Goner*, Kachh.

17. *Chela bacaila*, Ham. Buch. *Vai matchi*, Kachh.

Family.—SILURIDÆ.

18. *Macrones carcio*, Ham. Buch.

Local, only found in the deep recesses of streams. Another larger species also occurs, it is probably *Macrones aor*, H. B.

On the land shells of Penang island, with descriptions of the animals and anatomical notes; *part first*, Cyclostomacea, *by* Dr. F. Stoliczka.

(Read and received 6th August, 1872).

[With plate X.]

Penang, or Prince of Wales island, although possessing a rich vegetation, growing on old metamorphic soil, a moderately hilly ground, and a moist warm climate,—all elements most favorable to Molluscous life,—has up the present time yielded a comparatively very small number of land shells, and this in spite of the repeated visits which it had received from numerous travellers to the East. I can scarcely find record of more than ten species of both Cyclostomacea and Helicacea, which had been reported to occur on Penang. The paucity of shells seemed to me scarcely credible; but, when visiting the island in 1869, I was not a little astonished to meet for days with nothing else except *Bulimus atricallosus* and *citrinus*, and *Helix similaris* in the low country, cultivated with coco-palms and nutmegs, while in the hills the only common species were a *Rotula* and *Cycloph. Malayanus*, Benson's *Helix Cymatium*, described from Lancavi, being much rarer. After many days wanderings I noticed that all those portions of the ground, which at any, even remote, time shewed signs of having been once under cultivation, were hopeless in a malacological point of view, and I turned into the more wild and deep ravines of the North-Western part of the island. There, after some days search, particularly in the extensive and very dense forests along the edges of more open tracks, abounding with a rich under-vegetation, I was more successful by adding a good number of land shells to the few already known. Many of these are new to science, and as I had obtained all the species alive, and noted the peculiarities of the structure of the animals, my observations, even as regards the few formerly described species, may be useful in supplementing the information which we already possess.

I shall begin in this first part of the paper with the Cyclostomacea, of which ten species will be reported. My remarks will on this occasion not enter into anatomical details, because I wish to reserve these for a comprehensive study on the anatomy of all the Indian and Barmese species of this group, and the isolated facts would not prove equally interesting as when related in connection with others.

In the second part, which will treat of the Helicacea, I will, however, give all those anatomical details, which are in many instances essential for the correct determination of the different genera.

Group.—CYCLOSTOMACEA.

Fam. CYCLOPHORIDÆ. *Genus*, CYCLOPHORUS, Montf.

CYCLOPHORUS MALAYANUS. Pl. X, Figs. 1-5.

Benson, A. and M. N. H., 2nd ser., vol. x, p. 269. Pfeiffer, Monograph Pneumonopomorum. Suppl. I, p. 42. Reeve, Conch, vol. xiii, *Cyclophorus*, pl. 1, fig. 2.

This is a tolerably common species on Penang, being generally distributed from near the seashore to the top of Penang hill, about 2500 feet.

I have given a whole series of illustrations in order to shew the different stages of growth, although Reeve's figure is a very good representation of an adult specimen.

Ordinarily the shell is smooth, exhibiting only the usual finer and stronger striæ of growth, but the pale brown and thin cuticle when well preserved is spirally striated, the striation being more conspicuous in younger shells than in more adult ones.

Young specimens of only two or three volutions have very conspicuous transversely oblique cuticular striæ, and in this stage the shell with its angular last whorl perfectly resembles Pfeiffer's *Cyclostoma (Leptopoma) Birmanum*,* which is no doubt either a young of the present species or of *C. Siamensis*. Nearly all young *Cyclophori* have these transverse filiform striæ of the cuticle.

When larger the shell scarcely differs from that of *C. Cantori*, Benson, of which figures are given by Pfeiffer in Chemnitz' Conch.-kab., and also by Reeve. I have not obtained in Penang any such small specimens with fully developed lips as are represented in those figures, but I have observed that the usual difference of the male being often slightly smaller than the female also exists in the present species, and an illustration of a nearly full grown male, given in fig. 4, comes very close to that of Reeve. Judging from the difference observed in the size of the sexes of other species, as is for instance very often the case in *C. Pearsoni*, I am inclined to the opinion that the specimens described as *C. Cantori* are males of *C. Malayanus*, the latter being females. If this were the case, the former name would have priority over the latter, but even if the explanation of sexes would not in this case hold good, I believe that the form described as *Cantori* can scarcely be looked upon as anything else than a smaller race of *Malayanus*, and *vice versâ*.

The animal is grey, darker on the head, brownish on the tentacles, pale towards the tip of the rostrum and at the basal edges of the foot.

* Chemnitz' Conchylienkabinet, Vol. IX, p. 363, and Mon. Pneum. Suppl. II, p. 85.

What Hanley figures, in Conch. Indica, pl. xlviii, fig. 4, as *C. Malayanus* from the Shan States, has, I believe, nothing to do with the Penang shell, though it may represent a variety of *Siamensis*, or a peculiarly depressed one of *flavilabris*, but it is impossible to form a good idea of the character of the species from the insufficient illustration given.

CYCLOPHORUS BORNEENSIS, var. Pl. X, Fig. 6.

Metcalfe, Proc. Zool. Soc. 1851.—Pfeiffer in Chem. Conch., XIV, p. 362 and Mon. Pneumon. p. 63.—Martens, Ost.-As. Exped., p. 136.—Reeve, Conch. Vol. xiii, *Cyclophorus*, pl. xii, fig. 50.

The Penang variety of this species is flatter, somewhat sharper keeled at the periphery, and with a slightly more expanded lip than exists in any Bornean specimens I saw, but the general type of the shell is unmistakable. It is a rare species on Penang hill; I found during many days search only two adults* and one young. The former are covered with a rather thick dark brown cuticle, marked with very fine transversely oblique and also with spiral striæ, by which a kind of a very minute granulation is produced. There is a row of larger brown spots along the suture, while the rest of the whorls is densely variegated with reddish brown, most conspicuous after a partial removal of the cuticle, and the keel is slightly funiculate. This coloration is almost exactly like that of *C. porphyriticus*, as figured by Pfeiffer in Chemnitz' Conchilienkabinet.

One of the most important characters of *Borneensis* is the straightness and slight concavity of the inner portion of the peristome along the umbilical margin, followed by the basal portion being somewhat produced. This character also occurs in *C. aquila* and *perdix*, with the last of which Benson's *C. porphyriticus* has been considered as identical. E. v. Martens already observes (l. cit. p. 135) that it is impossible to give a well defined diagnosis of *C. aquila*, as the species is very variable and readily passes into *Borneensis* and *perdix*. I have not a sufficient series of authentic specimens from different localities, but the few from Penang, Singapore and Borneo entirely support the view expressed by E. von Martens, and make it most probable that the different names noticed only refer to the principal varieties of one and the same species. It is unquestionable that even in true Bornean specimens the upper convexity of the whorls is sometimes greater sometimes less, the keel on the last whorl sharp, or obtuse, or again almost obsolete, and in consequence of this the sharp edged last whorl passes into an obtusely angular or even slightly rounded one, and that with these variations the height of the entire shell must naturally vary.

I possess Singapore specimens of *Borneensis* which exactly agree with *C. porphyriticus*, as figured by Pfeiffer in Chemnitz, and as this figure is

* The figured specimen is the more depressed one.

authentic, being taken from the type in Benson's collection, I would not hesitate to add *porphyriticus* as a synonym of *Borneensis*. Sowerby's original figures of *perdix* (at least fig. 127 in Thes. vol. I) and of *aquila* scarcely differ, and both very well agree with the form of *Borneensis* as usually obtained at Singapore, having the whorls above rather inflated and the periphery very obtusely angular. The same applies to Chemnitz's figure of *aquila*, while that of *perdix*, after Tenaserim specimens, very closely corresponds with one of my Penang specimens of *Borneensis*, except in having a greenish cuticle. Reeve's figure of *aquila* is probably taken from a specimen obtained inland north of Singapore; those specimens are particularly fine and probably most aberrant from the type shell, which Reeve figured as *Borneensis*, while his figure of *perdix* has the whorls as round as *Siamensis*, and though it may belong to the same species as represented by Sowerby's figure 128 in Thes. vol. I, I do not think that it can at all be referred to the *Borneensis* group, because it appears to want the peculiar straightness of the inner portion of the peristome.

The solution of this question of identity depends now upon a comparison of the type-specimens of Sowerby's *C. perdix* and *aquila* with a good series of typical *Borneensis*, as represented in Borneo, near Singapore, Malacca and Penang ; for it will also determine the nomenclature of the latter species.

The animal of the Penang variety of *Borneensis* is uniform pale brown with a slight pinkish tinge, and covered with numerous flat greyish warts ; the foot is rather narrow and very long posteriorly, the lateral basal portion below the pedal row is warty, not sulcated ; head slightly darker than the body, tentacles blackish near the tip ; eyes on small bulgings, surrounded by a pale ring ; mantle greyish, thick near the margin. There is scarcely a noticeable difference in the size of the sexes.

The only other species of *Cyclophorus* which I have to mention, and which has been described from Penang, is *C. Pfeifferi* of Reeve. It belongs to the section of *C. tuba* with a very much expanded peristome, without any markedly straight inner, or produced basal portion. E. v. Martens (l. cit. p. 134) states that it is probably not constantly different from *C. tuba*, but, setting aside the more inflated whorls of the latter species, I believe, *Pfeifferi* also differs from the last by a much more rapid increase of the volutions. In this point, as well as in the flattened and angular shape of the whorls, it, however, quite agrees with *expansus*, and a large specimen of this last from Tenaserim scarcely at all differs from Reeve's illustration ; I would, therefore, be inclined to regard *Pfeifferi* as identical with *expansus*.

Genus. OPISTHOPORUS, Bens.

There is no apparent distinction between the shells of *Opisthoporus* and those of *Spiraculum.* A cursory examination of the animals of a few species also shewed, that no essential distinction exists in the general anatomical structure, and but a very slight one in the dentition.

The only difference, which as far as known is a constant one, consists in the structure of the operculum. In the former genus this is discoid, horny on the inner side, calcareous on the outer, and composed of spiral laminæ entirely covering a tube. In *Spiraculum* the upper spiral layer is also generally calcareous, and more or less elevated, but the spiral canal is always open, not forming a closed tube. The former structure of the operculum is peculiar to *Cyclotus*, the latter to *Pterocyclus* and some species of *Cyclophorus.*

OPISTHOPORUS PENANGENSIS, n. sp. Pl. X, Fig. 7.

O. testa sub-discoidea, apice paulum exserta, latiuscule umbilicata, corneo solidula; anfractibus 4·5 *ad* 5, *teretibus, sutura profunda junctis, epidermide brunnea vel nigrescente, transversim confertissime striata, in ultimo anfractu ad peripheriam superam et inferam breviter ciliata, indutis, sub epidermidem albescentibus atque strigis transversis, brunneis vel fuscis, paulo undulatis, aut plus minusve acute angulatis, notatis; apice sub-mammillato, nigrescente vel pallido; umbilico modico, fere dimidium latitudinis anfractus penultimi exponente; ultimo anfractu ad aperturam valde descendente, sed haud dissoluto, ad suturam tubulo brevi tenuique, sæpissime retrorsum curvato, rare fere verticali, rarissimeque antice versus directo, in speciminibus adultis circa* 1·5 *ad* 2 *mm. a margine apertural distante, instructo; apertura circulari, ampla, obliqua, peristomate in junioribus simplici, in adultis breviter bilabiato, margine labii interni paululum incrassato, sæpe rubescente tincto, haud distincter discreto, externo expansiusculo; ambobus supra paulum productis atque prope suturam modice insinuatis. Operculum discoideum, interne vix, externe distincte, concavum et album, multispiratum, medio corneo-testaceum, laminis duabus separatis ad peripheriam acutissimis. Diam. maj.* 11·5; *diam. min.* 9·5; *altit. testæ* 6·6; *diam. apert. int.* 4, *externæ cum perist.* 4·7 *m.m.*

This species is evidently closely allied to E. v. Martens' *O. Sumatranus*,* which is of nearly exactly the same size, but its whorls are decidedly thinner and on the upper side more flattened, the upper apertural margins are considerably more produced, the plain of the aperture being, therefore, more oblique to the axis, while the sutural tube appears to be more distant from the margin. The direction of the tube was observed in four specimens of *O. Sumatranus* to be nearly vertical, while in about eighty specimens of the

* Preuss. Exped. nach Ost-Asien., Zool. Theil, vol. II, p. 112.

Penang form it is directed backwards, being sometimes when well preseved perfectly parallel to the suture ; in a few specimens, however, it is nearly vertical, and in two or three even slightly directed forward. The character is, therefore, evidently variable. Young shells, sometimes measuring up to 9 mm. in the longer diameter, still have no sutural tube developed, while others (mostly males) reach the adult stage already at even a somewhat smaller size.

Hab. I found the species common under dead leaves on the ground along the base of the Penang hill, mostly in dense jungle.

Animal stout, blackish, sometimes mottle with grey and tinged with pink, nearly smooth, with few little warts, paler at the sides and at the end of the foot which is, when fully extended, about twice the longer diameter of the shell ; it is pointed at the end ; operculigerous lobe slightly more thickened in front than behind ; tentacles paler at base, blackish on terminal half, slightly thickened towards the end, but pointed terminally ; eyes small, on laterally slightly prominent bulgings, united to the base of the tentacles ; rostrum wrinkled, cleft in front, and with pale lips ; penis of male long, thin and black, without any appendage.

OPISTHOPORUS SOLUTUS, n. sp. Pl. X, Figs. 8-10.

O. testa planorbulari, apice paulo exserta, late umbilicata, corneo solidula; anfractibus 4·5, *fere teretibus, supra et infra paululum depressiusculis, sutura profunda ac simplici junctis, in spec. junioribus ad peripheriam sub-angulatis ; ultimo ad terminationem dissoluto, paulo expansiusculo modiceque deflexo, tubulo suturali antice directo, circiter* 2 *m.m. a margine aperturali distante, instructo ; anfractibus superioribus epidermide fusco-olivacea, transversim rugata, in ultimo fere simpliciter confertimque striolata, indutis, omnibus sub epidermidem albidis, sparse scrobiculatis, transverse minutissime striatis ; apice albido ; umbilico magno, anfractuum omnium maximam partem exhibente ; apertura lata, circulari, peristomate duplici, interno tenui, paulum projiciente, externo undique modice dilatato, in facie antica concaviusculo et concentrice striato, in regione supra-suturali sensim producto ; ambobus ad suturam anguste emarginatis. Operculum normale, in utroque latere vix concavum, multispiratum, medio corneo-solidum. Diam. maj.* 15·5 *; diam. min.* 11·5 *; alt. testæ* 7·3 *; diam. apert. int.* 4·3, *ext. cum perist.* 5·5 *m.m.*

Young shells of this species (comp. fig. 8) are regularly planorbular, with a simple, continuous, thin lip of the aperture, and the olivaceous epidermis is rather coarsely rugose, forming darker transverse bands ; under the lens also a very fine spiral striation is to be observed. In the middle stage (fig. 9), when the shells possess 3·5 to 4 whorls, and a diameter of 10 to 13 m.m., the margin of the aperture has a short, open, sutural canal,

exactly as in the South Indian *Pteroc.* (*Myxostoma*) *tristis*, Blf., and which canal is the origin of the sutural tube, becoming fully developed in the more adult shell, as soon as the end of the last whorl begins to detach itself from the previous one.

Hab. Penang ; I have only obtained about 15 specimens of this species, also under dead leaves on the ground in dense jungle together with the last, which is, however, the more common one.

The animal is entirely of a rather pale grey colour, nearly smooth, slightly mottled with darker ; tentacles blackish, with a few darker spots about and between their bases, entirely black at tip ; rostrum cleft, wrinkled, with a pale lip ; lateral pedal row rather indistinct, as also in the preceding species.

Fam. PUPINIDÆ.

Raphaulus Loraini, which was described by Pfeiffer from Penang out of Cuming's collection, was not met with by me.

PUPINA AUREOLA, n. sp. Pl. X, Figs. 11-12

P. testa oblique ovata, apice breviter sub-acuta, glaberrima, politissima, moderate solida, intense vel luteole succinea, prope peristoma aurea ; anfractibus sex, convexiusculis, in adultis sutura indistincta junctis, primis duobus sub-mammillatis, ultimo spira breviore, valde descendente ; apertura parva, circulari, labio incrassato, sulco satis profundo ab anf. penultimo separato ; incisionibus angustis sed profundis ; labro antice sensim producto, extus paulum incrassato, aureo tincto. Operculum orbiculare, altum, corneum, ad utrumque latus paulo concavum, ex lamella sprialiter torta tenuissima compositum, nucleo depresse circulari, paullulum incrassato instructum. Long. testæ 8·8, *lat. ad medium* 5, *diam. apert. ext.* 2·3 *m.m.*

Hab. Penang ; haud frequens.

This species is closely allied to *P. aurea*, Hinds, differing from it by a smaller aperture, a more laterally produced, shorter and slightly contracted last whorl. The solidity of the shell and the intensity of coloration naturally varies with age ; young specimens are thin, and nearly transparent, pale straw-coloured, the suture is distinctly impressed and the outer lip very slightly produced. In adolescent specimens the upper labial rib is rather distant from the posterior angle of the mouth (see fig 11), as in the Tenaserim *P. arula*, but the Penang shell is shorter and stouter. Old specimens are entirely covered with a polished glaze, and are intensely or yellowish rufous brown, with a yellow inner and outer peristome.

The animal is of the usual Cyclophorid type, uniform, intense or greyish black, paler along the sides of the foot, which is of about the same length as that of the shell.

MEGALOMASTOMA SECTILABRUM, Gould. Pl. X, Fig. 13.

Penang specimens agree with those from Tavoy in having a smaller aperture and a slightly slenderer spire, with somewhat convex sides, while in *M. anostoma* from Borneo the spire is more regularly conical and the aperture larger.

Animal blackish grey with a slight reddish tinge; the edges of the foot, including the posterior end and the tentacles are vermilion, tips of rostrum pale grey. The length of the foot equals about three fourth of that of the shell when the animal moves about; the entire body is rather distinctly warty, but no well defined pedal row exists; the rostrum is adpressed to the foot, strongly wrinkled and cleft at the end; posterior end of foot obtusely pointed, eyes small, the bulgings united at their bases to the tentacles. The mantle is pale, entire, closely attached to the peristome of the shell, and not protruding beyond it.

Operculum horny, circular, composed of several spiral layers arranged round a slightly thickened or mammillated centre so that the width of each lamina equals the radius of the whole operculum. This structure is somewhat peculiar, it agrees with that of the South Indian *Cataulus recurvatus*, but not with that of the other *Catauli* or *Megalostomata* examined; in all these the operculum is distinctly multispiral.

The species occurs at elevations from 400 to about 2100 feet on the Penang hill, but it is evidently a very scarce shell; I found only one live specimen at the top of the hill.

Fam.—DIPLOMMATINIDÆ. *Sub-fam.* ALYCÆINÆ.

ALYCÆUS GIBBOSULUS, n. sp. Pl. X, Fig. 14.

A. testa gibboso turrita, anguste umbilicata, violaceo rubente, ultimo anfractu pallidiore, lutescente, apice albescente; anfractibus quinque, valde convexis, sutura profunda et simplici junctis; primo lævigato, tribus sequentibus transversim densissime striato-costellatis, atque spiraliter striatis, ultimo gibbose inflato, paulo distinctius costellato, prope aperturam breviter sed valde constricto, sub-lævigato, vix deflexo, post constrictionem tubulo tenui, circiter duo ad tres m.m. longo, nonnunquam fere immerso, instructo; apertura circulari, modice lata, in adolescentibus margine simplici undique expansiusculo circumdata, in adultis bilabiata, labio interno extus tubuliforme producto, crassiusculo, externo dilatato atque tenui. Operculum solidum, latere interno corneo, convexiusculo, medio submammillato, multispirato, impressione musculari transverse ovata atque excentrica instructo, externo calcareo, concaviusculo, in superficie irregulariter rugoso. Diam. maj. 9·2, *diam. min.* 7, *alt. testæ* 9·6; *diam. apert. int.* 3·8, *externæ* 4·8 *m.m.*

In general character this interesting new species closely resembles the type of the genus, *Al. gibbus*, Fér., but the latter conspicuously differs by

having the constricted portion of the last whorl much more produced and very much deflected, the height of the shell being also considerably less than the larger diameter of the shell. Eydoux who collected the species at Touranne in Cochin-China, says in his original description,* that the operculum is membranaceous and not multispiral.

The species is not uncommon along the base of the hills in thick jungle, under and on large blocks of rocks, generally between half decomposed vegetable matter.

The animal is dusky grey, foot pale; tentacles long, pale at the base, further on dark, especially at the tips which are slightly thickened; eyes small, placed laterally at the bases of the tentacles, but the bulgings are not distinct; rostrum long, cleft at the end, reddish at the base on account of the fleshy colour of the manducatory apparatus.

Fam.—LAGOCHEILIDÆ.

Genus. LAGOCHEILUS, Theobald.

Comp. Blanford in Ann. and Mag. N. H., third Ser., 1864, vol. XIII, p. 452.

Shell conoid sub-turbinate and perforated, thin, covered with a horny cuticle; aperture round with a narrow incision in the upper or posterior angle; operculum thin, horny, multispiral. Animal of the usual Cyclophorid type, but with a glandular slit at the upper posterior end of the foot.

The shell of *Lagocheilus*, when the cuticle is removed, merely differs from *Leptopoma* by the slight incision in the posterior angle of the aperture. When Mr. Theobald suggested the above name, it could scarcely have been anticipated that such a comparatively insignificant character will be accompanied by a most important structural distinction in the anatomy of the animal. Mr. Blanford, already many years past, noticed that the animal of the Burmese *Lagocheilus leporinus*† has the peculiarity of possessing a groove down the middle of the upper caudal portion of the foot. Since then I had observed the animals of *L. tomotrema*, of two new species from Penang, and of two other species from the Nicobars, and I find that all the animals posses a long glandular slit at the upper end of the foot, and that the incision in the apertural margin is the result of the presence of this pedal slit. This instance is an excellent illustration of the occasional intimate structure and the relation of the animal to its shell.

Lagocheilus, together with *Dermatocera*, has evidently among the CYCLOSTOMACEA the same systematic position, as the ZONITIDÆ have among the HELICACEA. The external character of the animal of *Lagocheilus* is accompanied by some peculiarities in the dentition and in the internal organs with which I hope to deal at some future occasion, in connection with a general account of the anatomy of the Indian CYCLOSTOMACEA.

* Guérin-Méneville's Magasin de Zoologie, for 1838.

† Journal A. S. B. for 1865, Pl. II. p. 82.

The species which are at present known to belong to the genus are: *L. tomotrema*, Bens., (Sikkim, Assam and Cachar), *leporinus*, Blf., (Barma), *trochoides* and *striolatus* from Penang, *Wüllersdorfi*, Pfr. and Zel., and another as yet undescribed species also from the Nicobars; *scissimargo*, Bens., from Tenaserim. These localities indicate the geographical extent of the genus. Reeve in his Monograph of *Cyclophorus*, when speaking of *L. scissimargo*, says that there is more or less an indication of a notch in the aperture of *C. triliratus*, Pfr. (= *quadrifilosus*, Bens.,) while Pfeiffer in his second Supplement to the Pneumonopoma (p. 29) refers the latter species to *Cyclotus*.

LAGOCHEILUS TROCHOIDES, n. sp. Pl. X, Fig. 15.

L. testa turrito conica, sub-anguste umbilicata; anfractibus sex, sutura profunda simplici junctis, primis duobus convexis, ceteris supra medium angulatis, ultimo bi-angulato; omnibus cuticula opaco-fusca indutis, transversim striolatis, spiraliter striatis, striis filiformibus: duabus in anfractu penultimo supra angulum subdistantibus, infra angulum 4-5 approximatis: in anfractu ultimo angulis duobus ad intervalla breviter ciliatis; basi in adultis prope peripheriam et ad umbilicum, in junioribus omnino, confertim striata; testa sub cuticulam albida, ad apicem rubescente; apertura rotundata, modice obliqua, in angulo superiore vel postico distincte incisa, bilabiata: labio interno breviore, violaceo tincto, externo fere plane expansiusculo, in facie concentrice striolato, ad marginem exteriorem atrato. Operculum multispiratum, tenue, corneum. Diam. maj. 10, *diam. min.* 8, *alt. testæ* 9·6, *diam. apert. int.* 4·2, *externæ* 5 *m.m.*

This is the largest species as yet known of the genus, the more regularly conical form, angular whorls, numerous spiral striæ, absence of brown spots on the shell, etc., readily separate it from *L. scissimargo.* The fine transverse striolation of the cuticle is very easily worn off, but the spiral striation is always very distinct, and well marked even after the removal of the cuticle. Young shells have a striking resemblance to those of *Cremnoconchus Syhadrensis;* they are comparatively more largely umbilicated than adult ones, and their cuticle is more or less distinctly olive, while in the latter it is dark brown in fresh specimens, often becoming reddish brown in dried ones.

Hab. Penang. I found the species on large stones between decaying vegetable matter at an elevation of from 200 to about 1000 feet; it is scarce.

The animal is pale grey, the body itself being slightly darker than the foot; the rostrum is long, deeply cleft in front, reddish at the base; tentacles long, and thin, dark grey, blackish towards the tips; eyes on their outer base on indistinct bulgings; a dark pedal row, moderately swollen, extends from the lower base of the rostrum to behind the operculum, from which a deep, narrow glandular slit proceeds along the middle to the end of the foot.

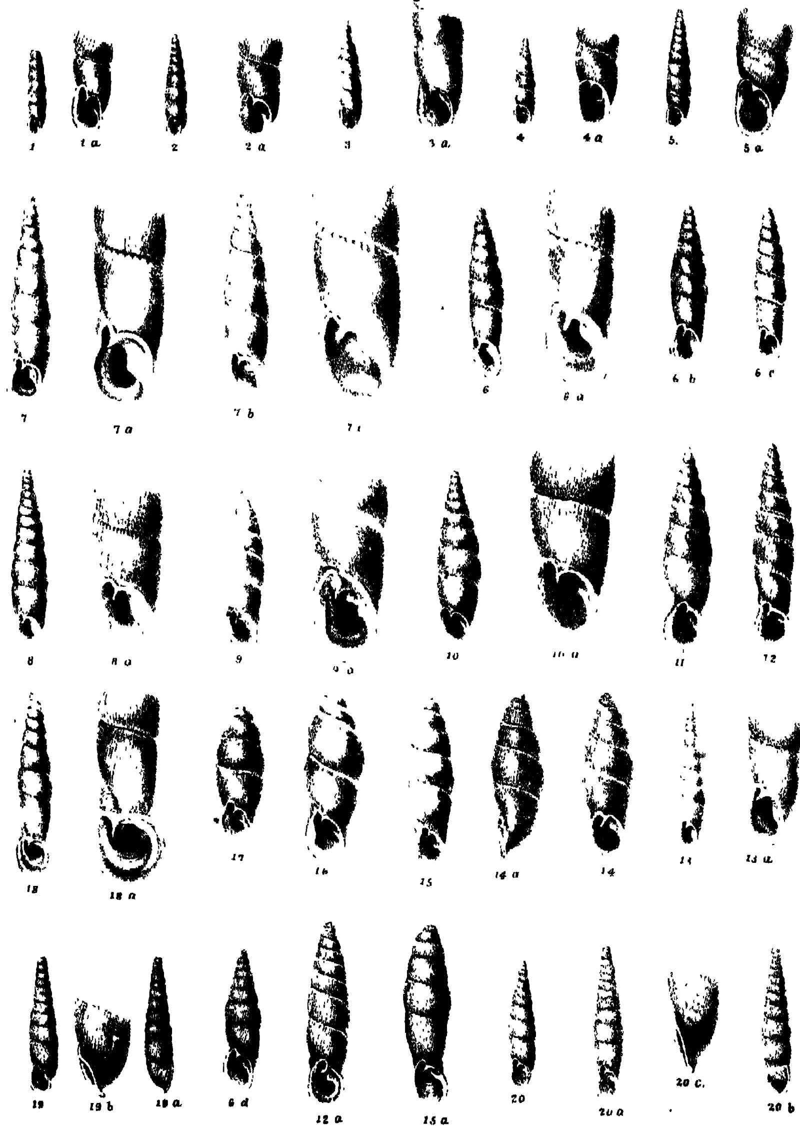
LAGOCHEILUS STRIOLATUS, n. sp. Pl. X, Fig. 16.

L. testa turrito conoidea, anguste umbilicata; anfractibus 5·5 *convexis, sutura simplici junctis, ultimo ad peripheriam inferiorem vix-angulato; apice lævigato, olivaceo; anf. ceteris cuticula fusca vel brunnea indutis, transversim oblique subdistanter, et spiraliter densissime, striolatis; basi sub-lævigata vel sub-obsolete spiraliter striatula; apertura ampla, sub-circulari, peristomate postice ad angulum profunde inciso, infra ad latus basale conspicuiter producto, bilabiato, labio interno in junioribus violaceo, in adultis ad marginem albido, externo undique fere æqualiter planeque dilatato, corneo. Operculum tenue, corneum, multispiratum. Diam. maj.* 6, *diam. min.* 5, *alt. testæ* 6·6; *diam. apert. int.* 2·6, *ext.* 3·2 *m. m.*

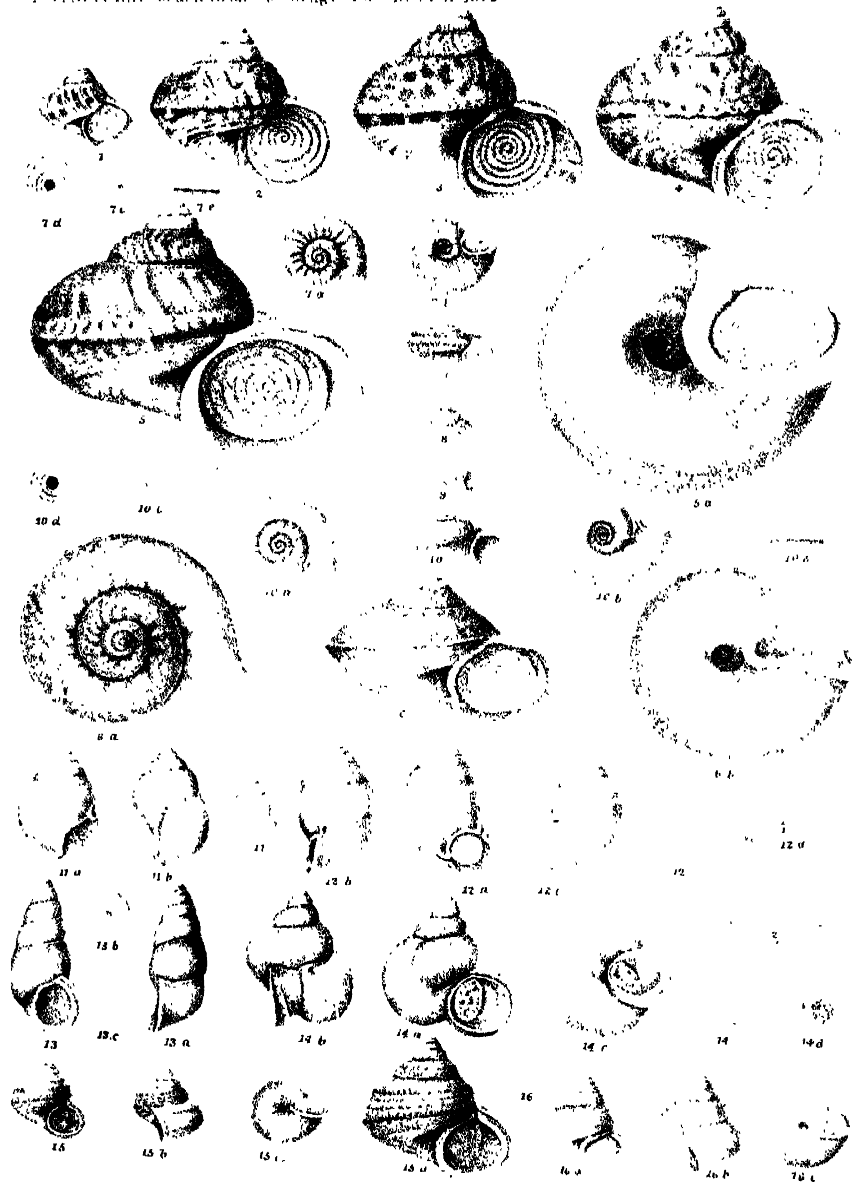
This smaller form resembles *L. tomotrema* and *leporinus*, but it is distinguished from both by a slightly larger spiral angle, rounded (not angulated) whorls, and by the very dense, filiform, spiral striation.

Hab. Penang. Under dead leaves on the ground along the base of the hills, together with the last species; rare.

Animal leaden grey, with moderately elongated, darker, cylindrical tentacles; eyes on minute bulgings, joined on the inner side to the base of the tentacles; upper posterior part of the foot with a narrow glandular slit, extending from the operculigerous lobe to the end; lateral pedal row very thin.



1. C. cylindrica p. 199 & 207.
2. C. Ibs. p. 200
3. C. bacillum p. 200 & 207.
4. C. ceylanica p. 201
5. C. Theobaldi " "
6. C. laxostoma p. 201 & 208.
7. C. ferruginea p. 202.
8. C. Asaluensis " "
9. C. fusiformis p. 203.
10. C. Gouldiana " "
11. C. insignis, Gould. p. 204 & 208.
12. C. insignis, Pf. H. & T. p. 204
13. C. monticola "
14. C. Philippiana. p. 205.
15. C. vespa, p. 205 & 209
16. C. bulbus p. 206
17. C. ovata " "
18. C. Masoni " "
19. C. Waageni, p. 209.
20. C. Arakana p. 210.



1–5 *Cyclophorus Malayanus*, p. 262
6 " *Borneensis*, p. 263
7 *Opisthoporus Penangensis*, p. 266
8–10 " *solutus*, p. 266.
11–12 *Pupina aureola*, p. 267
13 *Megalomastoma sectilabrum*, p. 267.
14 *Alycæus gibbosulus*, p. 268
15 *Lagochilus trochoides*, p. 270
16 " *striolatus*, p. 271

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ASIATIC SOCIETY.

Part II.—PHYSICAL SCIENCE.

No. IV.—1872.

Notes on a collection of Birds made in the Andaman Islands by Assistant Surgeon G. E. Dobson, M. B., during the months of April and May,—*by* V. Ball, Esq., B. A.

[Read 6th, received 16th August, 1872.]

A short time ago Dr. Anderson placed in my hands for determination a collection of birds, made in the Andamans by Dr. Dobson,* subsequently adding two received from Mr. Homfray.

The collection contains 184 specimens belonging to sixty-two species, of which eighteen are new to the hitherto recorded avifauna of those Islands; but they are for the most part migratory birds *(Grallæ)*, whose occurrence might safely have been predicated from their being known from the coasts on both sides of the Bay of Bengal, and to some extent from Malayana.

One species only is described in the following list as new, but there are four others presenting certain peculiarities which may hereafter justify their separation from the species under which they are now enumerated. As these are represented by single specimens, I think it undesirable to exaggerate the importance of what may ultimately prove to be only individual variations from the type. The species are: *Ephialtes spilocephalus*, Blyth ?; *Palæornis Alexandri*, Linn.; *Brachypodius melanocephalus*, Gmel.; *Rallus striatus*, Linn. One result of the examination of this collection has been that while it supports Col. Tytler's views as to the distinctness of certain Anda-

* Mr. Wood-Mason and Dr. Dobson visited the Andaman Islands to collect for the Indian Museum. The vertebrate portion of the collection was under Dr. Dobson's care.

man species, it furnishes almost conclusive evidence against others being so. Mr. Blyth has already pointed out that *Spilornis Elgini*, Tytler = *S. bacha*, Bodd.; *Collocalia affinis*, Tytler = *C. Linchi*, Horsf.; *Palæornis affinis*, Tytler = ♀ *P. erythrogenys*, Blyth, and *Herodias Andamnensis*, Tytler = *H. concolor*, Blyth.

In so far as the present collection afforded material, I have endeavoured to give full descriptions of those species which have hitherto only been partially described, and to amplify the information regarding others.

According to the present state of our knowledge, the avifauna of the Andamans includes 109 species; possibly this number may have to be reduced by four.* But it is made up in this way. The late Capt. Beavan's list gives 94 species from which three, *viz.*—*Hæmatornis Cheela*, Bodd., *Palæornis affinis*, Tytler, and *Pericrocotus Andamanensis*, Tytler, must, I think, be subtracted, and 18, the number of additional species in the present collection, added, or 18 + 94 — 3 = 109. It should be stated, however, that five of the species mentioned by Capt. Beavan were introduced into the Islands by Col. Tytler. The number of indigenous birds should therefore stand at 100 + 4? Of this number twelve are local species and six? are known only from the Andamans and Nicobars.

In the Nicobars there are about fifty-three species known at present, of which number seven are local.

Excepting the migratory birds, particularly the *Grallæ*, from our consideration, the bulk of the non-local species in the Andamans are Indian, and in the Nicobars Malayan.

Where there are two allied species, or two races or varieties of a species in India, the Andaman, as a general rule, corresponds with the southern form. To this rule there is an exception in the case of *Graucalus Macei* which is the northern species, *G. Layardi* being the southern. However, the Andaman bird seems to be intermediate between *G. Macei* and *Javensis* from Java which two, according to Blyth, only differ in size.

Judging from the number of species of birds known to occur in the several groups of islands in the Malayan Archipelago we may feel confident that much yet remains to be done both in the Andamans and Nicobars, before a list approaching completeness can be prepared.

The present, and to a certain extent, all previous collections were made in the vicinity of Port Blair, throughout an area, probably not exceeding 30 or 35 square miles, or by a rough estimate about one-hundredth part of the total area occupied by these islands.

* The species of *Nectarinia*, *Ægialitis*, *Herodias* and *Querquedula* of Col. Tytler's and Capt. Beavan's lists may possibly be only the same species as four birds which are given under other names in my list.

Several families and genera, which all analogy would lead us to believe must find a place in the Andaman avifauna, are as yet unrepresented in any of the collections of which descriptions have been published.

The following is a list of the purely local species which are not known to occur elsewhere:

Spizaetus Andamanensis, Tytler.
Muelleripicus Hodgii, Blyth.
Centropus Andamanensis, Tytler.
Graucalus Dobsoni, n. sp.
Dicrurus Andamanensis, Tytler.
Dissemurus affinis, Tytler.
Myiagra Tytleri, Beav.
Oreocincla infra-marginata, Blyth.
Oriolus Andamanensis, Tytler.
Kittacincla albiventris, Blyth.
Dendrocitta Baylei, Tytler.
Temenuchus Andamanensis, Tytler.
Euryzona Canningi, Tytler.

The species found in the Andamans and Nicobars, but not elsewhere, are:

? *Ninox affinis*, Tytler.*
Palæornis erythrogenys, Blyth.
Geocichla innotata, Blyth.
Eulabes Andamanensis, Tytler.
Treron chloroptera, Blyth.
Macropygia rufipennis, Blyth.

In the following enumeration and description a dagger (thus †) prefixed, indicates that the species has not been previously recorded from the Andamans.

Fam. AQUILINA.

1. SPILORNIS BACHA, Daud. *H. bido*, Horsf. No. 87 of Blyth's Catalogue, *S. spilogaster*. Blyth *Hæmatornis Elgini*, Tytler.

H. Elgini, Tytler, is considered to be identical with *H. bacha* by Mr. Gurney, and both Mr. Blyth and Dr. Jerdon confirm this opinion (Ibis, N. S. IV. 1868, p. 131 and 3rd Series, 1871, Vol. I, p. 335). Dr. Jerdon writes: "It appears fully agreed on by all that the small Serpent Eagle of Ceylon and Southern India is the same as the Andaman bird."

In my previous paper, from not having seen Mr. Blyth's remarks, I entered my specimens as *Cheela*, as they had the wing longer than in Tytler's *Elgini*. In the present collection, which contains five specimens in various stages of plumage, all belong to the small species. The variations in plumage correspond with those observable in the different stages of *Cheela*,

* I am rather inclined to believe that this bird will prove to be the same as Temminck's *Strix hirsuta* which Pelzeln records from the Nicobars.

I could not see any constant characters which would serve to distinguish the two species other than that of size. Measurements of a male in inches: wing 14·2; tail 9·2; bill to gape 1·8; tarsus 3·4.

2. HALIÆTUS LEUCOGASTER, Gmel.

Three specimens in various stages of plumage. Length of wing of adult 20·8 inches.

Fam. STRIGIDÆ.

3. EPHIALTES SPILOCEPHALUS, Blyth. (?)

So far as it is possible to make out one of these difficult birds without a good series for comparison, the specimen of Andaman scops before me appears to correspond most nearly with Blyth's description of *E. spilocephalus* (= *S. Malayanus*, Hay ?) J. A. S. B. XV. p. 8, and with a specimen of that species from Masuri in the old collection, No. 147, I, of Blyth's Cat.

Mr. Hume only doubtfully refers *spilocephalus*, Blyth, to *gymnopodus*, Gray, so that for the present I think it safer to give Blyth's name. The bird certainly belongs to the *pennatus* type as distinguished by Mr. Hume, though Col. Tytler records *E. Lempiyi* from the Andamans.

Authorities are so divided as to the nomenclature to be adopted in reference to this genus, that without attempting to discuss the question as to what species *spilocephalus* should be finally referred to, I shall confine myself to shewing the points of resemblance between the Andaman bird and *spilocephalus*, Blyth, by the description of the former which is as follows:

Above. Rufous inclining to bay, each feather of the head, back of neck, scapulars, wing coverts, back and rump with two fawn colored spots edged with black. Primaries—first two not grown, fourth and fifth equal, five white spots on the outer webs. Tail rufous brown, darker on the inner webs of the rectrices, with four white bands.

Beneath. Facial disk fawn colour. Loral bristles black, white towards the base. Breast and abdomen finely mottled with brown and fawn or dusky white, each feather with two brownish black spots which are separated by a white bar. Tarsi covered for three-fourths of their length with short rufous colored feathers, barred with brown. Feet and claws not quite so slender as in the Masuri specimen.

Measurement in inches: wing 5·6; tail 3; tarsus 1.

Fam. HIRUNDINIDÆ.

4. COLLOCALIA LINCHI, Horsf. *Hirundo fuciphaga*, Thun.

Trans. Linn. Soc. XIII, p. 143, *C. Linchi* et *C. fuciphaga*, Wallace, P. Z. S. 1863, p. 384. *C. affinis*, Tytler ?

The present collection contains three specimens of *Collocalia* which appear to have been taken from the nest as the primaries are not fully grown.

They correspond in length of body and coloration with specimens of *C. fuciphaga* from Batavia and the Nicobars (Blyth's Cat. No. 429). They appear also to be the same species as that figured as *C. Linchi* in 'Reise der Novara,' Vögel, T. II, f. 2, save that the metallic lustre as represented is far too brilliant. The following is a description of our specimens.

Above. Black with dark green reflections, an indistinct white band on the rump, no spots on the tail. *Underneath.* A white rictal spot; from chin to breast cinereous, the edges of the feathers lighter, thence to vent greyish-white, feathers centered cinereous; under tail-coverts centered greenish-black. Length to end of tail 3·3, wing 2·95, tail 1·4 inches.

Col. Tytler's specimens from the Andamans, which he described as *C. affinis*, had the following dimensions:—

	Length.		Wing.		Tail.	
♂	3·75	inch.	3·52	inch.	1·36	inch.
♀	3 5	„	3·75	„	1·36	

Fam. MEROPIDÆ.

5. MEROPS QUINTICOLOR, Vieil.

The collection contains six specimens of this bird.

Fam. CORACIADÆ.

† 6. EURYSTOMUS ORIENTALIS, Linn.

Three specimens. Is said to be common, but has not been previously recorded from the Andamans.

Fam. ALCEDINIDÆ.

7. ALCEDO ASIATICA, Swains. (*A. meningting*, Horsf.) Two specimens.

8. PELARGOPSIS BURMANICA, Sharpe. *Halcyon Gurial*, Pearson.

In this list I follow Mr. Sharpe's classification and geographical distribution of the five races of *Halcyon leucocephalus*, at the same time I feel strongly inclined to believe that a critical examination of the whole series at present in the Indian Museum will shew that it cannot stand in its integrity.

Our present specimen closely resembles some of the duller plumaged individuals of *H. Gurial* from Bengal, and also agrees to a certain extent with Sharpe's description of *Burmanica*, but differs from the figure given of that race in the following particulars: the feathers of the head and nape are much more albescent, the ochreous collar is broader and the blue of the wings and tail has no tinge of greenish. Length 13·2; wing 6, tail 4·4, bill at front 3, tarsus 6 inches.

9. HALCYON COROMANDA, Lath. Two specimens.

10. Halcyon Smyrnensis, Linn.

This resembles specimens from Southern India and Ceylon in the brilliancy of the coloration. Length 10·8, wing 5, bill at front 2·4 inches.

11. Halcyon chloris, Bodd. Sharpe, Monograph of *Alcedinidæ*, p. 229. *Todiramphus collaris*, Scop.

The collection contains several specimens of this bird which is said to be one of the commonest on the Islands.

Fam. Psittacidæ.

12. Palæornis Alexandri, Linn.?

While aware of the considerable amount of variation which *Palæornis Alexandri* is subject to, I should be disposed to claim for the Andaman bird now before me a position as a distinct species, were I able to affirm that the characters which it exhibits are constant; but on this point I have no information at present. The specimen, a male, at once attracted notice by the enormous size of its bill; and on closer examination and comparison with a good series of Indian specimens, I found that it possesses other characters which distinguish it from the Indian bird of normal plumage.

The black stripe from the lower mandible to the demicollar of peach-rose, so marked in ordinary specimens, is in this reduced to a narrow line which commences half an inch from the mandible and terminates at the first point of contact with the peach-rose, not being continued as a border to it, as it commonly is for three-fourths of an inch or so in Indian specimens. The head and cheeks, down to the collar, are of a vivid emerald green without a trace of the purplish grey or hoary bloom which is present in all Indian birds which I have examined. The dark red spot on the shoulders is smaller than usual? and the blue of the central tail feathers of a much more decided hue. The wing is somewhat shorter than in any of the Indian specimens with which I have compared it.

Dimensions of bill.	Gape to point.		Width at gape.	
	A.	B.	A.	B.
Up. mandible, ...	1 15 inch.	1·15 inch.	·95 inch.	·85 inch.
Lr. mandible, ...	·75 „	·65 „	·9 „	·8 „

Depth of both mandibles closed A. 1·7, B. 1·5.

A is the Andaman bird, B a specimen of ordinary dimensions from the Rajmahal Hills. Should all the Andaman birds prove to have the above characters I would propose the name *P. magnirostris* for the species.

If the characters be constant, they are as sufficient to distinguish the two races as are those which distinguish the two races of *P. rosa*. I may perhaps mention that in looking through a drawer full of these latter, I found

that Cachar and Darjiling (? Terai) specimens agreed with Barmese in having the under wing coverts green, &c.

13. PALÆORNIS ERYTHROGENYS, Blyth.

J. A. S. B., XV, 1846, p. 23, and XXVII, 1856, p. 81. *P. Nicobaricus,* Gould, P. Z. S. p. 555. B. of Asia, 1857, Pt. IX.

Mr. Blyth (Ibis, IV, 1868, p. 132,) has pointed out that although the name *erythrogenys* has been applied to three species of this genus, in the case of two it is reduced to the rank of a synonym, and therefore his name is entitled to stand.

In my former paper I agreed with Blyth in considering Tytler's *P. affinis* to be only the female of this species. If it be not, then we might ask what is the female like? neither the present nor any previous collection contains any specimen of the red-billed birds which do not correspond exactly with authentic males.

There is one point about the female not noticed by Blyth, the moustache is deep green, not black as in the males.

Measurements in inches.

	Length.	Wing.	Bill from gape.	Tarsus.
♂	14·	6·8	·85	·55
♀	10·7	6·8	·76	·55

† 14. PALÆORNIS JAVANICUS, Osbeck.

Blyth writes " *P. Javanicus* differs only from *P. Vibrisca,* in the Javan bird having a red lower mandible, while the other has a black one; but in some Javan specimens the lower mandible is blackish and Mr. Gould has a specimen from Siam with a red under mandible; the Hainan birds have it black." Finsch in his Monograph '*die Papageien*' includes both under *P. Lathami,* Finsch.

The specimen in the present collection, a male, has the under mandible black. Length 13; wing 6·8; tail 7·8; tarsus ·6 inches.

15. LORICULUS VERNALIS, Sparrm.

Identical with Indian specimens, wing 3·5 inches.

Fam. PICIDÆ.

16. MUELLERIPICUS HODGII, Blyth.

The collection contains a good series of this bird which appears to be common. The measurements of one are somewhat different from those of my own specimen (J. A. S. B., XXXIX, p. 241): wing 6·8; tail 6 2; bill at front 1·6; tarsus 1·2 inches.

17. PICUS ANDAMANENSIS, Blyth.

Blyth distinguishes this bird from *P. pectoralis* by its having *three* pair of distinct white spots on the middle rectrices, while *P. pectoralis* has four. "But the Andaman bird is specially characterized by the large

round black spots upon its breast, each margined with whitish; the ear coverts also are longitudinally more conspicuously rayed than in the others. In other respects this bird resembles *P. macei.*"

The present collection which contains five specimens shews that the number of spots on the middle tail feathers is not a constant. In three (2 ♂ and 1 ♀) there are four pairs of spots and in the remaining two (1 ♂ and 1 ♀) there are only three.

♀ Length 6·25; wing 3·87; tail 2·25; tarsus ·75 inches.

Mr. Blyth has seen this bird in a collection from Sumatra.

Fam. Cuculidæ.

† 18. Cuculus microptebus, Gould.

One specimen. This bird has not been previously brought from the Andamans.

19. Centropus Andamanensis, Tytler. Ibis, N. S. III, 1867, p. 321.

The collection contains four specimens. Head, neck to middle of back, chin, throat and breast rufous grey. Abdomen, thigh-coverts and under tail coverts the same with an ashy tinge. Back, rump and upper tail-coverts ashy. Wings and scapulars rufous bay. Tail brown, paling from the centre to the margins of the feathers. Bill black. Length 17 to 18; wing 7·5; bill at gape 1·7; tarsus 1·9 inches.

Fam. Nectariniidæ.

† 20. Arachnechthra frenata, Müll.?

The specimens of *Arachnechthra* hitherto received from the Andamans have been identified as *pectoralis*, and following suit in my previous paper on Andaman birds I stated that species to be "common on Mount Harriet." The birds in the present collection are distinguished from *pectoralis* by wanting the slightest trace of a metallic blue frontal patch. With the characters of *A. frenata*, Müll., given by Lord Walden in the Ibis for 1870, p. 26, they agree and the wing exactly corresponds with that of Müller's figure; but there is no trace of a maroon pectoral band represented, which though slight, is present in all our ♂ specimens. The yellow supercilium is distinctly marked. Another character which distinguishes this from *pectoralis*, and helps to separate it from several other species, is the size of the bill which closely approximates to that of *A. intermedia*, Hume.

Length 4·2; wing 2·1; bill at front ·8, tail 1·4 inches.

Fam. Laniadæ.

21. Lanius lucionensis, Scop.

A specimen of this bird is identical in coloration with one in the Indian Museum from Mr. Swinhoe, Amoy. It differs from the ordinary Indian

specimens of *cristatus* in the silvery white of the forehead, chin, and throat, and in the almost entire absence above of any tinge of rufous except on the upper tail coverts. Length 7·1, wing 3·5, tarsus ·95, bill at front ·5 inches.

22. Graucalus Macei, Lin.

The collection contains five specimens of *Graucalus*, three of which answer very closely to the characters of *G. Macei* or *G. Javensis*, being indeed of intermediate size and thus affording a link between the Indian and Javan birds which, according to Blyth, only differ in size. They have the wings white underneath, and the outer tail feathers broadly tipped with white. One specimen has the abdomen slightly barred, in the others it is simply albescent.

Length.		Wing.		Tail.		Bill from gape.		Tarsus.	
11	inch.	6 62	inch.	5	inch.	1·58	inch.	1·1	inch.
11·1	„	6·75	„	5·12	„	1·5	„	1·	„

The remaining two specimens I at at first thought might be the young of the above; but closer examination convinced me that they are adults in full plumage belonging to a distinct species.

† 23. Graucalus Dobsoni, n. sp.

So far as the literature available in Calcutta has enabled me to compare this bird with the hitherto described species of this genus it appears to be distinct. I at first supposed it might be *striata*, Bodd.=*Novæ-guineæ*, Gmel. &c., but it differs in several particulars from Lesson's description of that species. The following is a description.

Above dark slatey, darkest on the head; wings and tail brownish-black, primaries, secondaries and tertiaries lighter on the inner webs, faintly edged with white on the outer; two outer rectrices on each side narrowly tipped with dusky white; a black stripe from the lores round the eyes to the ear coverts, thence faintly continued as a collar in one of the specimens. *Underneath* white barred with black from chin to under tail-coverts inclusive; under wing-coverts similarly barred. Bill conspicuously smaller than in *G. Macei.* Length, 10·2, wing, 6·2, tail, 5·4, bill from gape, 1·23, tarsus, ·95 inch.

I have named the species after Dr. Dobson.

24. Pericrocotus speciosus, Lath.—Gould, B. of Asia, pt. IX, pl. 4.

A good series of this bird has been brought. It includes several young males with the transitional plumage. I have little doubt that *P. Andamanensis*, Tytler, is only *P. speciosus* in immature plumage. It is said to have "the plumage of *P. speciosus* with more yellow or flame-colour mingled with the scarlet. It is also apparently smaller." The amount of red on the central tail feathers of this bird varies much in specimens from various parts of India and Barma. Four out of five males in this collection have the central tail feathers wholly black.

I have shot in Bengal and examined from other parts of India many specimens of *P. speciosus*, none approach in size Gould's figures which are said to be *life.*

25. Pericrocotus peregrinus, Linn.

Andaman specimens correspond with the darker plumaged variety of this bird from Madras and Ceylon, from one of which Gould's figure is taken.

I have not seen any description of *P. flagrans*, Boie apud Bonaparte, from Borneo and Sumatra, possibly the southern form should be referred to that species.

26. Buchanga (Dicrurus) Andamanensis, Tytler.

This is, I believe, a good species, somewhat resembling *D. balicassius*,* but distinguished from that species by its large sharply keeled bill and hair-like feathers, which spring from the nostril. The bill is more like that of a *Dissemurus* than a *Dicrurus*; so much is this the case that in a former paper J. A. S. B., XXXIX, pt. II, p. 241, I was inclined to refer a very young bird of this species with the tail feathers only partly grown to the former rather than to the latter genus. I have compared it with all the specimens mentioned in Blyth's Catalogue including *edoliformis*, but it is certainly distinct from any of them.

Above and below black, with a greenish metallic gloss; primaries brown, fourth and fifth longest and equal, outer tail feathers with a slight curl upwards, under wing-coverts spotted with white lunules; no rictal spot.

Length.	Wing.	Tail.	Bill to gape.	Tarsus.
11·6	5·5	6·75	1·25	·87 inch.
10·5	5·25	6·	1·25	·87 "
11·	5·2	6·3	1·25	·8 "

27. Dissemurus (Edolius) affinis, Tytler et Beavan.

The late Capt. Beavan, (Ibis, N. S. III, p. 323) discussed the reasons which led him to the conclusion that the Andaman bird is distinct; since that time much has been written on the subject, but the nomenclature of the species is far from being in a satisfactory state. To start with, it is uncertain whether the three following species should be regarded as really belonging to three, two or one: *E. Rangoonensis*, Gould, *E. Malayensis*, Blyth, *E. setifer*, Temm.

Dr. Jerdon (B. of I. Vol. I, p. 438,) and Mr. Gray (Hand list, p. 287), maintain that *Malayensis* and *setifer* are identical; but Lord Walden (Ibis, 3rd Series, I. p. 174), states that the Javan *E. setifer* is distinct from *Malayensis*, and asks whether the latter is distinct from *Rangoonensis?* calling it the Barmese species. Mr. Blyth has stated (B. of I. Vol. I, p. 438), that *Rangoonensis* is not from Barma but from the Philippines, and so far

* *D. balicassius*, Linn., was obtained at sea near the Nicobars, according to Blyth.

as I can see there is no authentic case of a non-crested specimen having been obtained in Barma. There are certainly none in the Indian Museum. Several specimens collected by Dr. Williams and now in that collection are well crested and should be ranked as *paradiseus* according to Jerdon's classification. From *D. Rangoonensis*, as described by Gould, P. Z. S. 1836, the Andaman bird is distinguished by its larger bill and longer wing, if not by other characters; from *D. Malayensis* (= *setifer* ?) as represented in the Indian Museum (As. Socy. Coll.) by its very much larger size. Other doubtful species of non-crested *Dissemuri* are *D. brachyphorus*, Temm., apud Bonap., and *D. singularis*, Gray.

In the present Andaman collection there are three specimens which have only a very slight trace of frontal crest, their measurements are:

	Length to end of ordinary tail.	Wing.	Bill from gape.	Tail.	Outer T. feathers.	Tarsus.
Sex ?	12 inch.	6·2 inch.	1·45 inch.	6·2 inch.		1 inch.
♂	12 „	6·4 „	1·5 „	6·5 „	15. inch.	1·1 „
Sex ?	13·3 „	6 5 „	1·5 „	7 „	17. „	1·1 „

28. ARTAMUS LEUCOPYGIALIS, Gould, P. Z. S. Lon. 1842, p. 17.

Lord Walden, P. Z. S. 1866, p. 555, has identified the Andaman bird with Gould's Australian species. I have compared with it Gould's plate and can see no difference in the plumage, but the bill of the Andaman bird seems larger.

Fam. MUSCICAPIDÆ.

29. MYIAGRA TYTLERI, Beav.

Both Mr. Blyth (Ibis, 1868, p. 132) and Dr. Jerdon (ibid. 1872, p. 122) doubt the distinctness of the Andaman bird from the widely distributed *M. azurea*, Bodd.; but chiefly, I, believe on the ground of that wide distribution. With the specimens, 2 ♂ and 2 ♀, now before me, and not having been able to discover, in the Indian Museum, any specimens, or any published description of Indian birds shewing the same departure from the typical coloration, I am inclined to follow Capt. Beavan in his determination of the Andaman bird as distinct.

M. Tytleri, Beav., is said to " differ conspicuously in entirely wanting the black gorget on the throat of the male." (Ibis, N. S. III, 1867, p. 324). This character as suggested by an editorial footnote is only an individual peculiarity. In the two males before me, the gorgets are distinctly marked; but the other specific characters, the brighter coloration of the upper parts and the continuation of the blue of the breast to the abdomen which becomes slightly paler towards the vent, serve to distinguish this bird, if not as a species, at least as a well marked variety of *M. azurea*. The under tail coverts are white with a sky-blue tinge. The female like the male has no white on the abdomen; wings and tail brown.

Measurements in inches.

	Wing.	Tail.	Bill.	Tarsus.
♂	2·9	2·7	·45	·65
♀	2·8	2·7	·45	·65

Fam. MERULIDÆ.

30. GEOCICHLA INNOTATA, Blyth.

One specimen. Length 7·2; wing 3·5; bill at front ·7; tarsus 1·1—inches.

Fam. BRACHYPODIDÆ.

31. OTOCOMPSA JOCOSA, Linn.

The Andaman appears to be identical with the Indian species.

† 32. BRACHYPODIUS MELANOCEPHALUS, Gmel. ?

One specimen in immature plumage may belong to this species. The metallic feathers of the head have not appeared. The outer edges of the primaries are yellowish green.

33. IRENA PUELLA, Lath. Vide Ann. and Mag. Nat. Hist. 4 Ser. Vol. V, 1870, p. 417.

The Andaman species of *Irena* corresponds with that found in Southern India (Travancore). It has the short tail coverts which, according to Lord Walden, distinguish *Irena puella* from *I. cyanea* and *I. turcosa*. The collection contains males, females, and young males in transitional plumage.

	Wing.		Tail.		Bill at front.		Tarsus.	
♂	5	inches.	4	inches.	·9	inches.	·75	inches.
♀	5	„	4	„	·9	„	·75	„
Young ♂	4·9	„	4	„	·8	„	·7	„

34. ORIOLUS MELANOCEPHALUS, Linn. One specimen.

35. ORIOLUS ANDAMANENSIS, Tytler.

In his last published remarks on this species (Ibis, IV, 1868, p. 132) Mr. Blyth states his belief that the Andaman *Oriole* is distinct from *Horsfieldi*, Bonap.; previously having relinquished his original supposition as to its identity with *coronatus*, Swainson. He considers it to be "most nearly akin to *O. macrurus* of the Nicobars, but is rather smaller." It is distinguished from *O. macrurus* not only in size but in the amount and distribution of the yellow on the wings and tail and black on the head. From *Chinensis*, i may readily be distinguished by the black on the nape being much narrower, *Indicus* having it of intermediate size.

A specimen in full adult plumage, has the wings black save the extremities of secondaries and tertiaries which are narrowly tipped with yellow, and a bar formed of yellow tips to the wing-coverts of the primaries.

The collection contains three specimens, and there are six in the old collection which were described by Blyth. Dimensions of one; length 8·8; wing 5·3; bill at front 1; tarsus ·9; tail 3·35 inches.

Fam. SYLVIADÆ.

36. COPSYCHUS SAULARIS, Linn.

Three specimens belonging to the Indian, not the Malaccan species (*C. Mindanensis*). A fully grown male has the four outer rectrices on either side white, this is a character according to Blyth, which distinguishes *C. saularis* from both *Mindanensis* and *Ceylonensis*.

37. KITTACINCLA ALBIVENTRIS, Blyth. Three specimens.

Measurements of ♂ : length 7·8 ; wing 3·55 ; bill to gape ·87 ; tarsus 9·5 inches.

38. ARUNDINAX OLIVACEUS, Blyth, J. A. S. B. XIV, p. 595. *A. ædon Pallas ?*

Three specimens of this not very well known bird. They correspond very closely with Blyth's original description and type specimens so far as the faded condition of the plumage of the latter admits of comparison. In dimensions, however, they are somewhat smaller :

	Length.		Wing.		Tail		Bill at front.		Tarsus	
A.	6·6	inch.	3·07	inch.	3·1	inch.	·55	inch.	1·03	inch.
B.		„	3·13	„	3·2	„	·53	„	1·03	„

A, is the Andaman bird ; B, a bird in the Museum labelled by Blyth. The measurements of both are less than those given in Blyth's original description and in the "Birds of India," II, p. 157. Another of Blyth's specimens on the same stand is larger than B, and more nearly corresponds with the published measurements.

Fam. CORVIDÆ.

39. DENDROCITTA BAYLEI, Tytler, Ibis 1863, p. 119.

A good series of this bird.

Measurements in inches.

	Length.	Wing.	Tail.	Bill to gape.	Tarsus.	
♂	12·2	4·6	7·2	1·	1	inch.
Sex ?	11·8	4·6	7·	1·1	1	„

In my previous paper J. A. S. B. XXXIX, p. 242, "wing 2¼," "was misprinted for 4¼."

Fam. STURNIDÆ.

40. CALORNIS PANAYENSIS, Scop. = *C. cantor*, Gm. Vide Ibis, 3rd Series, Vol. I, 1871, p. 176.

The Andaman specimens (five), including both young and adults, appear to be identical with the Indian species.

41. TEMENUCHUS ANDAMANENSIS, Tytler.

The specimens in this collection (both ♂ and ♀) go far to establish Tytler's opinion as to the distinctness of the Andaman bird from *T. erythropygia*, Blyth, from the Nicobars. None of them shew the slightest tendency

to rufescence on the rump, upper tail coverts, under tail-coverts or tail feathers, as is so distinctly marked in the Nicobar birds.

I observe too, though I doubt its being a constant character, that the bill of the Nicobar bird is somewhat more slender and less conical than in the Andaman specimens.

♂ Wing 4·3; tail 3·2; bill at front 1·1; tarsus 1 inch.

42. Eulabes Andamanensis, Tytler.

In my previous paper I simply confined myself to pointing out that the Andaman and Nicobar birds are identical, feeling that without a larger series for comparison, and in the state of opinion on the subject of the different races of *Eulabes*, my safest course was, to follow Lord Walden, who has pronounced the Andaman bird to be a distinct and good species. Since that time, Dr. Stoliczka has discussed the subject at length (J. A. S. B. XXXIX, pt. II, p. 326) and has been replied to by Lord Walden (Ibis, 3rd Series, Vol. I, p. 177). Dr. Stoliczka believes the Nepal, Arracan, Andaman, Nicobar, Wellesley province and Malacca birds to be "geographical races of the same species" viz., *E. Javanensis*, Osbeck.

Lord Walden maintains not only the distinctness of *intermedia* and *Andamanensis*; but from recent examination of specimens from Malacca questions their identity with the true *Javanensis* from Java.

I have before me two specimens from a dealer's collection from "the Straits" which I take to belong to the large Malacca species generally known as *Javanensis*. In these the bill is well curved and high; the naked space below the eye is quite disconnected with the wattles.

The Andaman and Nicobar specimens are smaller and have the bill lower and straighter. The bare patch underneath the eye is *not* absolutely disconnected from the wattles. So far as I can see the colour of the bill and the size of the lappets are extremely variable in specimens from the same locality. In my Nicobar specimen, the commencement of the wattles behind the eye is broader than in either of the Andamanese, but in other respects, the size and shape of the bill, feet &c., there is no perceptible difference.

Measurements in inches of a specimen in Dr. Dobson's collection.

Wing 6·3; tail 3·25; bill from gape 1·5; tarsus. 1·4.

Fam. Fringillidæ.

43. Munia leuconota, Tem.

Two specimens. Feathers not striated.

Fam. Treronidæ.

44. Osmotreron chloroptera, Blyth.

This bird is said to be common, the collection contains only one specimen however. There are grave suspicions that the bird-skinner made the

discovery,—and acted upon it pretty frequently—that like other green pigeons, it is very good eating. Measurement in inches: wing 6·85, bill at front ·65, tail 4·25, tarsus ·85.

45. Carpophaga sylvatica, Tickell.*

The identity of Andaman with Indian specimens of this bird has been fully established. The collection contains three specimens.

Fam. Columbidæ.

46. Turtur humilis, Temm.

One specimen. The upper parts are of a rather deeper tint than in most Indian specimens.

47. Macropygia rufipennis, Blyth, J. A. S. B. XV, p. 371.

Three specimens, two of which, marked ♂, have the rufous of the neck, upper part of the back, breast and abdomen barred with dark brown slightly undulating lines, which are close and distinct to the breast; thence to the vent they are wider apart, broken and fainter.

In a fourth specimen which is somewhat smaller, and may be either a young bird or the female, the bars are confined to the back of the neck, and the rufous of the wing coverts, edges of the wings, throat and abdomen is of a deeper tint approaching to bay.

Mr. Blyth in his original description has pointed out the characters which distinguish this species,—the smaller size, and rufous underneath the wings—from *M. phasianella*, Gould.

The following are the dimensions of a male: length 14·15; wing 7·5; bill at front ·6; tarsus ·9 inch.

Fam. Gouridæ.

48. Chalcophaps Indicus, Linn.

Three specimens. Mr Blyth observes (Ibis, N. S. IV, 1868, p. 133): "I could perceive no difference between Andaman specimens and those from India and Barma, whereas the Nicobar race accords with the description of *C. augusta*, Bp. [*Comptes rendus*, 1855]."

Fam. Glareolidæ.

† 49. Glareola orientalis, Leach.

The collection contains two specimens which correspond exactly with specimens in the Indian Museum from the vicinity of Calcutta (Blyth's Catalogue, No. 1543).

Fam. Charadridæ.

† 50. Charadrius longipes, Temm.

Two specimens shot in May. In one the black of the summer plumage is beginning to appear.

† 51. ÆGIALITIS GEOFFROYI, Wagler.

Two specimens shot in May, have the winter plumage as described and figured by Mr. J. E. Harting (Ibis, 1870, p. 379):

Length.	Wing.	Bill at front.	Tarsus.
8·3	5·4	1	1·4 inch.
8·1	5·3	1	1·4 „

Col. Tytler says that he only obtained a distant view of the bird which is enumerated in Beavan's list as *Æ. pyrrhothorax* (= *Æ. mongolicus* apud Harting), so that it is not improbable that it was this species which he saw. It may have been this species too, which I observed in the Nicobars.

† 52. EUDROMIAS VEREDUS, Gould, P. Z. S. 1848, p. 38, B. of Australia, VI, pl. 14. Harting, Ibis, 1870, p. 209.

Mr. Harting's paper loc. c. enables a specimen in winter plumage to be identified with certainty. Length 8·2; wing 6·4; bill ·9; tarsus 1·8; uncovered portion of tibia ·9 inches.

Fam. SCOLOPACIDÆ.

53. NUMENIUS PHÆOPUS, Linn.

One specimen in the collection. The bird is said to be common in the clearings and cultivated grounds. It is enumerated in Blyth's list of Andaman birds but not in Beavan's.

It was obtained in the Nicobars by the Novara expedition, and also by myself; J. A. S. B. XXXIX, pt. II, p. 33.

† 54. ACTITIS GLAREOLA, Gmel.

† 55. ACTITIS HYPOLEUCOS, Linn.

One specimen of each of the above.

Fam. RALLIDÆ.

56. EURYZONA CANNINGI, Tytler, Ibis, 1863, p. 119.

This collection contains one specimen of the above rail, which was first described by Tytler and Blyth in the Ibis.

Mr. Wood Mason says the bird is rather common in the grass bordering creeks. The specimen was shot near Hopetown.

Measurement: wing 6·3; tail 3·3; bill at front 1·1; tarsus 2 inches.

† 57. RALLUS STRIATUS, Linn.?

This bird differs from *R. striatus*, as represented in the Indian Museum (Blyth's Catalogue, No. 1671), in its longer and more powerful bill and in the abrupt termination of the rufous of the head and back of the neck, which in ordinary specimens is continued for some distance along the sides of the bluish grey of the breast. In other respects it corresponds with the common Indian bird. Wing 5·15; bill at front 1·7; tarsus 1·55 inches.

Should specimens obtained hereafter shew that the above characters are constant, it may be then determined whether the Andaman bird must be regarded as belonging to a distinct race.

The present specimen was received from Mr. Homfray.

Fam. Ardeidæ.

† 58. Ardea purpurea, Linn.

Two specimens in immature plumage.

† 59. Herodias egretoides, Temm.

One specimen which differs slightly in measurements from those given by Jerdon: wing 11·2, bill at front 2·9, tarsus 4·4, middle claw 3·5 inches. The bill is yellow with a brown tip to the upper mandible.

Col. Tytler mentions having identified *H. garzetta* in the Andamans.

60. Herodias concolor, Blyth. *H. Andamanensis* Tytler.

Col. Tytler (Ibis, N. S., III, 1867, p. 333) proposed for the Andaman bird a new name in consequence of "the young being black *ab ovo*, whereas those of the species for which it has been mistaken are white;" to which Mr. Blyth replied (Ibis, N. S., IV, 133) "*H. Andamanensis* is decidedly identical with *H. concolor* of which I never saw a white example. It also inhabits the Nicobars and Arakan."

I have carefully compared all the specimens available from the three localities and the only difference which I can discern, is that the Andaman birds are on the whole a little smaller, but one of the Nicobar birds is about the same size as the largest Andaman.

Measurements in inches.

	Arakan.	Nicobars.			Andamans.			
	1	2	3	4	5	6	7	8
		Rev. J. Barbe.	V. Ball, (J. A. S. B., xxxix, p. 32.)	Rev. J. Barbe.	Present Collection.	Col. Tytler.	Present Collection.	Col. Tytler, (Ibis).
Wing, ...	11·4	11·1	10·75	10·5	10·5	9·8	9·8	9·62—9·75
Bill at front, ...	3·4	3·3	3·5	3·	3·2	3·3	3·	3·
Tarsus, ...	3·	2·8	3·	2·8	2·7	2·4	2·6	2·25—2·37

The white on chin and throat exists in Nos. 2, 5, 6, 7 and 8? Nos. 1, 3 and 4 have no trace of it.

61. Butorides Javanica, Horsf.

Two specimens are conspicuously smaller than any of a good series of Indian birds with which I have compared them; but correspond closely in coloration and other details of plumage. ♂ Wing 6·5; bill at front 2·4; tarsus 1·65 inches.

Fam. Anatidæ.

† 62. ? Mareca punctata, Cuv. Gould, Birds of Australia, vol. VII, pl. 11. *M. castanea,* Eyton.

What Col. Tytler's *Querquedula Andamanensis* may be I am unable to say, as it has not been described, and the original specimen appears to have been lost. *Prima facie* it is improbable that a local species of *Querquedula* exists in the islands. Be that as it may, the present collection contains specimens of what is commonly known as the 'teal' of the Andamans to the residents there. Except that they have a patch of white surrounding the eye and that the plumage of the head is somewhat darker, they correspond very closely with Gould's figure of *Mareca punctata,* Cuv. From his description it is evident that the plate exaggerates the bluish tinge of the velvet black speculum.

Two of the specimens shew an incipient stage towards the full breeding plumage of the male, scattered patches of bright ferruginous or chesnut appearing on the feathers of the breast and abdomen.

The occurrence of this species in the Andamans would be very interesting. It has previously only been found in Australia, Van Diemen's Land, the Moluccas and New Caledonia.

Note.—While the preceding pages were passing through the press the sad news of the death of Col. Tytler at Simla reached us. His name, so frequently mentioned above, will ever be inseparably connected with the avifauna of the Andaman Islands.

New Barmese Plants,* (Part First),—*by* S. Kurz, Esq.

DILLENIACEÆ.

1. Dillenia pilosa, Roxb. Fl. Ind. II. 652, non Ham.

Arbor decidua magna; folia adulta oblongo-obovata v. elliptico-oblonga, basi attenuata, obtusa v. rotundata, brevissime (2—3 lin.) petiolata, acuta v. obtusa, obsolete repando-dentata, 10—12 poll. longa, supra glabra, subtus secus nervos magis minusve pubescentia, juniora herbacea utrinque sparse pubescentia et petiolo foliaceo-alato subamplexicaulia; flores aurei, 2—2½ poll. in diametro, solitarii ex apice ramulorum verruciformium, pedunculis c. pollicaribus pubescentibus suffulti; series interior staminum exteriori duplo longior; styli et carpella 6; carpella matura calyce aucto aurantiaco tomentello carnoso globoso circa pollicem crasso inclusa.—*Andamans.*

ANONACEÆ.

2. Miliusa sclerocarpa, (*Uvaria sclerocarpa*, DC. Mém. 27).

Arbor decidua, 40—50 pedalis, novellis tenuiter adpresse sericeis; folia elliptico-oblonga ad oblonga, breviuscule petiolata, basi acuta, apiculata, chartacea, glabra; flores flavidi, dioici, 7—8 lin. longi, pedicellis brevibus gracilibus pubescentibus sustenti, fasciculos depauperatos brevissime pedunculatos axillares efformantes; sepala lineari-lanceolata, brevia, fulvo-tomentosa; petala exteriora sepalis conformia sed paullo longiora; petala interiora 7—8 lin. longa, lanceolata, obtusa, extus puberula, intus canescenti tomentosa; stamina numerosa, in toro subgloboso dense aggregata; flores feminei (cf. Hf. et Th. Fl. Ind.).—*Martaban, Tenasserim.*

MENISPERMACEÆ.

3. Melodorum (Pyramidanthe) macranthum, nov. sp.

Arbuscula 15—20 pedalis glabra gemmis fulvo-velutinis; folia oblonga v. elliptico-oblonga, crasse et breviuscule petiolata, basi acuta, 6—7 poll. longa, brevius v. longius acuminata; membranacea, glabra, nervis lateralibus arcuato-anastomosantibus, laxissime reticulata, utrinque pallide viridia; flores albi, speciosi, pedunculo pollicari puberulo suffulti, solitarii et laterales; sepala patentia, lato-ovata, 5—6 lin. longa, obtusiuscula, glabra, coriacea; petala alba flavescentia, exteriora lineari-lanceolata, sub-5-polli-

* Further particulars regarding stations, affinity of species, &c., will be given in my forthcoming *Contributions towards a knowledge of the Barmese Flora,* which I hope to have ready for publication as soon as the acquittal of other engagements allow me the necessary leisure for arranging and preparing the large materials already worked up.

caria, acuminata, basi paullulo attenuata glabra, interiora brevia, pollicem circiter longa, conniventia, lanceolata, obtusa, extus puberula glabrescentia, intus minute villosula; carpella oblique oblonga, stylo subrecurvo ovario ipso longiore terminata; stamina numerosa, linearia; connectivum capitatum.—*Andamans.*

4. Tinospora nudiflora, (*Cocculus nudiflorus*, Griff. Not. Dicot. 307).

Frutex scandens deciduus, caulibus sparse tuberculatis junioribus dense subalbido-pubescentibus; folia adulta ignota, novella petiolis longis pubescentibus instructa, ovato-oblonga, basi sinuato-rotundata, breviter acuminata, subtus molliter et subalbido-pubescentia; flores feminei brunneo-lutei, solitarii, graciliter pedicellati bracteati racemos 3—4 pollicares glaberrimos in axillos foliorum delapsorum solitarios formantes; bracteolæ subulatæ, parvæ; sepala 6, exteriora parva reflexa, interiora magna recurva; petala 6, ochraceo-lutea; staminodia totidem setacea petalis opposita; ovaria 3, toro semigloboso inserta; drupæ cerasi majoris magnitudine v. majores aurantiaco-luteæ, læves et lucidæ, putamen 5—6 lin. long., album, carinatum, læviusculum nec tuberculatum, endocarpo limpido aquoso nidulans.—*Pegu, Martaban, Tenasserim.*

CAPPARIDEÆ.

5. Cratæva hygrophila, nov. sp.

Frutex 2—3 pedalis simplex v. 4—6 pedalis, parce ramosus, glaberrimus, cortice brunneo leucosticto; folia eadem ac in *C. religiosa;* flores solitarii axillares, parvuli ?; baccæ 1—2 pollicares, oblongo-cylindricæ, longe (1—2 poll.) stipitatæ, læves, brunneæ, leucostictæ.—*Pegu.*

POLYGALEÆ.

6. Salomonia longiciliata, nov. sp.

Herbula annua ramosa, alis membraneis secus ramos ramulosque et foliorum marginibus longe albido-ciliatis, cæterum glaberrima; folia vulgo obovata, raro ovalia, semipollicem circiter longa, basi in petiolum brevissimum attenuata, superiora sæpius sessilia, obtusa et mucronulata, membranacea, 3-nervia, ciliata; flores minuti, purpurei, longius v. brevius spicati, spicis terminalibus et sæpius lateralibus; bracteolæ minutæ, subulatæ, sæpius persistentes; capsulæ transverse oblongæ, compressæ, læves (nec reticulatæ), lato truncato-emarginatæ, lateribus dentibus subulatis biseriatis cristatæ, sursum ad sinum nudæ; semina nigra, nitentia.—*Pegu.*

7. Polygala Karensium, nov. sp.

Fruticulus vulgo 2—3 pedalis glaberrimus; folia lanceolata ad lato-lanceolata, 4—8 poll. longa, basi in petiolum longiusculum attenuata, acuminata, membranacea, glabra, subtus glauca; flores majusculi, 6—7 lin. longi, albidi, apicibus lilacinis, breve et graciliter pedicellati, racemosi, secundi; racemi terminales et axillares, glabri, 2—3 poll. longi, foliis bre-

viores; alæ carinâ paullo breviores, obovato-lanceolatæ, obtusæ; carina petalis interioribus duplo longior, cristata; crista biloba lobis multifidis; capsulæ parvæ, c. 2 lin. longæ et latæ, rotundatæ, membranaceæ, alâ duplici latâ apice profunde emarginatâ cinctæ, glabræ; semina obovata, sericea, carunculo brevissimo albo suffulta.—*Martaban.*

8. POLYGALA CARDIOCARPA, nov. sp.

Herbula debilis glabra, habitu *P. glaucescentis*, cauli a basi vulgo efoliato apicem versus ramoso; folia 1½—2 poll. longa, ovata v. oblongo-lanceolata, basi acuta v. acuminata et subdecurrentia, longiuscule petiolata, acuta, tenere membranacea, flaccidissima, glabra, subtus glauca; flores parvi, racemosi; racemi axillares et terminales, graciles; capsulæ brevissime sed gracillime pedicellatæ, chartaceæ, ovales, validinerves, alâ duplici latâ apicibus valde productâ et profunde emarginatâ quasi formam obcordatam assumentes.—*Tenasserim.*

HYPERICINEÆ.

9. TRIDESMIS PRUNIFLORA, nov. sp.

Arbuscula 25—30 pedalis, decidua, trunco ramulis spiniformibus armato, novellis tomentellis; folia lineari- ad lanceolato-oblonga, juniora obovato-oblonga v. oblonga, 4—5 poll. longa, breve et graciliter petiolata (petiolo tomentoso), basi obtusa v. acuta et nonnunquam subinæqualia, chartacea, supra asperiuscule tomentella, subtus tomentella et crasse reticulata; flores pulcherrimi, lilacini; pedicelli 3—4 lin. longi, tomentosi, 3—5-ni fasciculati v. subcymosi, supra foliorum cicatricibus orientes; sepala fulvescenti tomentosa; petala fimbriata, glandulæ oblongæ, teretes, obtusæ; phalanges planæ, basin versus latiusculæ, filamentis supra medio liberis; capsulæ oblongæ, acutæ. (*Cratoxylon pruniflorum*, Kurz, MS. olim).—*Barma.*

10. CRATOXYLON NERIIFOLIUM, n. sp.

Arbor decidua, 40—50 pedalis, glaberrima; folia lanceolata v. elliptico-lanceolata, c. 4 poll. longa, brevissime petiolata v. subsessilia, basi sub-sagittata, glabra, acuta v. obtusiuscula, subtus pallida et distincte reticulata; flores parvi, pedicellis brevissimis, 3—2-ni cymosi, pedunculi breves compressi terminales et vulgo in paniculam longiusculam glabram collecti; sepala oblonga, obtusa, coriacea, glabra; petala c. 3—4 lin. longa, rotundata; phalanges planæ, filamentis a medio liberis; glandulæ hypogynæ ovarii longitudine, carnosæ, clavatæ, obtusæ; capsulæ sepalis paullo longiores, ovatæ.—*Chittagong, Pegu, &c.*

GUTTIFERÆ.

11. GARCINIA SUCCIFOLIA, nov. sp.

Arbor 30—35 pedalis, glaberrima; folia lanceolata ad oblongo-lanceolata, c. 2—4 poll. longa, breviuscule sed gracillime petiolata, basi acuta,

carnescente-herbacea (succo salino acido), vulgo acuta, glabra, nervis subtilibus secus margines anastomosantibus; flores albidi, parvi, solitarii v. terni, 2—3 lin. in diametro, breve crasseque pedicellata, terminales v. axillares; flores masc.: sepala 2 interiora petalis majora et tenuiora, nervosa; stamina numerosa, antheris oblongis marginatis planis 2-locularibus, in phalange erectâ brevi (lobatâ ?) subsessilibus; fl. fem. et fruct. ignoti.—*Pegu, Martaban.*

TILIACEÆ.

12. Grewia retusifolia, nov. sp.

Frutex 3—4 pedalis, velutino-tomentosus; folia obovata v. subobcordata, v. obcordato-ovalia, 2—3 poll. longa, brevissime petiolata, profunde retusa cum denticulo, argute duplicato-serrata, subcoriacea, supra minute et scabriuscule tomentella, subtus dense canescenti v. flavescenti tomentosa; flores ...... pedunculi breves, solitarii, axillares, hirsuti; torus brevis, dense hirsutus; drupæ rubicundæ, sparse hirsutæ, glabrescentes, pisi magnitudine, 2—lobæ lobis pyrenam solitariam 2—locularem includentibus.—*Pegu.*

13. Elæocarpus grandifolius, nov. sp.

Arbor novellis fulvo v. ferrugineo-tomentosis; folia largissima, 1—1½ pedes longa, obovato-oblonga v. ovalia, petiolis crassissimis 4—6 lin. longis tomentosis suffulta, basin versus subattenuata et sæpius subdecurrentia v. rotundata, membranacea, acute v. breve acuminata, minute et remote serrato-dentata, subtus præsertim secus nervos pilosula, supra glabra et subnitentia; flores majores, pedicellis ½—1 poll. fulvo-tomentosis, in racemos fulvo- v. ferrugineo tomentosos collecti; sepala lineari-lanceolata, ferrugineo-tomentosa, semipollicaria; petala paullo longiora, extus ferrugineo-pubescentia, bifida, lobis fimbriato-fissis; antheræ numerosæ, graciles, filamentis longiores in aristam antheræ loculorum longitudine desinentes; ovarium dense pubescens; drupæ pollicares, compressiuscule oblongæ, fulvo-puberulæ; putamen compressiusculum, rugosum.—*Pegu, Martaban, Tenasserim.*

LINEÆ.

14. Erythroxylon Kunthianum, nov. sp.

Arbor glabra; folia 3—4 poll. longa, oblongo-lanceolata, basi obtusa, breve et graciliter petiolata, breve et obtuse acuminata, raro obtusa, integra, chartacea, subtus glauca; stipulæ subulatæ; flores parvi, albi, pedicellis 6 lin. longis sursum incrassatis suffulti, vulgo bini in foliorum axillis v. supra cicatricibus petiolorum delapsorum; petala oblonga, ligulâ magnâ bifidâ; stamina alternatim breviora, filamenta basibus latis cum staminum tubo cohærentia; ovarium ovatum; styli 3, breves et crassi, a basi liberi; drupæ monospermæ, elliptico-ovales.—*Martaban.*

RUTACEÆ.

15. ATALANTIA LONGISPINA, nov. sp.

Arbuscula spinis 1—1½ pollicaribus rectissimis cylindricis horride armata, glaberrima ; folia elliptica v. elliptico-oblonga, petiolis glabris 2—3 lin. longis inarticulatis, 3—4 poll. longa, acuta v. obtusa, glabra ; flores solitarii v. bini in foliorum axillis, parvi, brevissime pedicellati (pedicellis glabris) ; calyx glaber, 5—dentatus ; ovarium verosimiliter glabrum, 3—angulare, in stylum brevem attenuatum ; baccæ (immaturæ) pruni magnitudine, ovatæ, acuminatæ, toro brevi suffultæ.—*Pegu, Martaban.*

OCHNACEÆ.

16. OCHNA ANDAMANICA, nov. sp.

Arbuscula decidua, glaberrima ; folia oblonga, v. elliptico-lanceolata, c. 4—5 poll. longa, brevi-petiolata, acuta et mucronata, setaceo- v. subtiliter serrulata, chartacea, supra nitentia ; flores speciosi, aurei, pedicellis gracilibus breviusculis demum elongatis articulatis ; pedunculi brevissimi simplices in ramulis lateralibus efoliatis terminales ; filamenta antherarum longitudine v. paullum longiora ; petala 5, sepalis paullo longiora, obovata, in unguem latam sensim attenuata ; calycis fructigeri sepala omnia erecto-conniventia ; styli apice omnes liberi et patentes.—*Andamans.*

17. OCHNA FRUTICULOSA, nov. sp.

Frutex pygmaeus, 1—3 pedalis, glaberrimus, deciduus ; folia vulgò cuneato-oblonga ad oblongo-lanceolata, circ. 4—5 poll. longa, acuminata, acuta v. sub-obtusa, basi in petiolum brevissimum attenuata, chartacea, argute serrata ; flores speciosi, aurei, pedicellis longioribus v. brevioribus supportati ; pedunculi omnino reducti v. breves simplices s. ramosi ; petala 5, obovata, unguiculata ; filamenta antherarum longitudine ; stylus sepalorum longitudine v. paullo longior, gracillimus, filiformis ; stigma minutum, truncatum ; calycis fructigeri sepala erecto-conniventia.—*Pegu.*

BURSERACEÆ.

18. CANARIUM EUPHYLLUM, Kurz (in Andam. Rep. Append, B. 4).

Arbor magna, glabra ; folia 2—3 ped. longa, impari-pinnata, glabra ; foliola 9—10 poll. longa opposita pinnulis inferioribus minoribus, oblonga v. ovato-oblonga, basi oblique rotundata, abrupte apiculata, longiuscule petiolulata, chartacea, serrulata, nitentia, glabra, inter nervos utrinque 12—9 laterales valde reticulata ; stipulæ nullæ ? ; flores majusculi, albi, breve et distanter racemulosi, in paniculam 1½ ped. longam axillarem glaberrimam collecti ; calyx 3—fidus, lobis latis obtusiusculis ; petala 3, lanceolata, acuta, crassiuscula, ½ poll. circiter longa, extus tomentella ; glandulæ hypogynæ 6, ellipticæ, obtusæ, geminatim cohærentes, luteæ ; stamina 6, filamentis basi cohærentibus ; stylus simplex ; drupæ....—*Andamans.*

19. CANARIUM ? COCCINEO-BRACTEATUM, (Kurz in Andam. Rep. Appendix B. 4).

Arbor mediocris, novellis fulvo velutinis ; folia impari-pinnata, 1—2 ped. longa, glabra ; foliola 3—4-juga, 5—7 poll. longa, opposita, breviuscule petiolulata, oblonga v. ovato-oblonga, basi inæquali-obtusa, in eademque arbore integerrima et setaceo-serrulata, acuminata, sub-coriacea, glabra, subtus inter nervos utrinque 10 laterales laxe reticulata, stipulæ majusculæ, profunde bifidæ et iterato fissæ, segmentis rigidis grosse dentatis puberulis ; flores (in alabastro) paniculas axillares coccineas tomentellas terminales efficientes ; bracteæ oblongæ, acutæ, tomentellæ, coccineæ.—*Andamans.*

MELIACEÆ.

20. SCHIZOCHITON GRANDIFLORUM, nov. sp.

Arbor mediocris novellis velutino-tomentosis v. pubescentibus ; folia alterna, abrupte pinnata, raro impari-pinnata, rhachide dense fulvescenti-tomentosa ; foliola 4—6-juga, hinc inde cum impari, opposita v. subopposita, breve crasseque petiolulata, oblonga v. oblongo-lanceolata, breve acuminata, integra v. subintegra, 6—10 poll. longa, supra (nervis exceptis) glabrescentia, subtus molliter pubescentia ; flores mediocres, c. 6 lin. longi, subsessiles et bracteolis lato-oblongis dense fulvo-pubescentibus sustenti, racemulosi, paniculas longe pedunculatas graciles dense fulvo-tomentosas axillares formantes ; calyx campanulatus, dense pubescens, obsolete 4—dentatus ; petala (testo Wight et Arn. sæpe 6) apicibus imbricata, circ. 6 lin. longa, dense pubescentia ; staminum tubus basin versus petalis adnatus, parce pubescens, apice crenato 6—7-lobatus, lobis truncatis oblongis et integris ; antheræ 6 v. 7 ; ovarium stylusque fulvo-pubescentes ; capsulæ 3-lobæ et pyriformes, circ. 1¼ poll. longæ, pericarpio crasse coriaceo lutescente, 3—valves ; semina solitaria, magna, arillo completo aurantiaco.—*Martaban, Tenasserim.*

21. WALSURA HYPOLEUCA, nov. sp.

Arbor mediocris novellis minute puberulis ; folia impari-pinnata, glaberrima, rhachide lævi v. sparse lenticellata ; foliola bijuga cum impari, petiolulis 1—(terminalibus 2—2½-) poll. longis glabris, elliptico ad oblongo-lanceolata, 6—8 poll. longa, basi obtusa v. acuta, chartacea, glabra, obtusiuscule et breve v. longiuscule acuminata, subtus glauca, inter reticulationes lævia (nec albido-tessellata) ; flores parviusculi, albi, pedicellis 1—2 lin. longis puberulis suffulti paniculam corymbosam sessilem v. subsessilem puberulam axillarem formantes ; calyx puberulus, lobis oblongis obtusiusculis ; petala 5, hinc inde ad 8 augmentata, lineari-lanceolata, acuta, puberula, 2 lin. fere longa ; stamina 10, nonnunquam usque ad 15, omnia libera ; filamenta linearia, æquilata, antheris multo angustiora, integra, villosa ; discus cras-

sus, ruber; ovarium immersum, dense fulvo-tomentosum; baccæ immaturæ canescenti-velutinæ, oblongæ, acuminatæ.—*Andamans.*

22. WALSURA (HEYNEA) PUBESCENS, nov. sp.

Arbuscula gracilis, 25—30 pedalis, novellis molli-pubescentibus; folia impari-pinnata, rachide terete pubescente; foliola 4-juga cum impari, brevius v. longius petiolulata (petiolulis pubescentibus), ovato-oblonga v. oblonga, basi nonnunquam parum inæquali acuta v. rotundata, 3—5 poll. longa, breve acuminata, integra et vulgo undulata, membranacea, subtus molliter flavescenti pubescentia; flores parvi, albi, pedicellis brevibus pubescentibus sustenti, paniculam longe pedunculatam corymbosam brachiatam axillarem formantes; calyx pubescens; petala circ. lin. longa, extus pubescentia; staminum tubus fere a medio liber, filamentis latis, glaberrimis, apice bifidis; capsulæ cerasi minimi magnitudine, globosæ v. ovoideæ, glabræ, rubræ, bivalves, semen unicum arillo (albo ?) indutum foventes.—*Martaban.*

23. CEDRELA MULTIJUGA, nov. sp.

Arbor elegans, 70—90 pedalis, novellis minute fulvescenti-puberis; folia usque ad 3 ped. longa, impari-pinnata, petiolis teretibus junioribus puberulis; foliola 12—15 juga cum impari, alterna, petiolulis 2—3 lin. puberulis suffulta, ovato-lanceolata ad lanceolata, subobliqua, basi inæquali rotundata, 5—6 poll. longa, acuminata, membranacea, integra; flores parvi, albi, pedicellis semi-lineam longis suffulti, paniculam strictam glabram racemose-contractam formantes; petala et sepala 5, urceolato-convergentia, oblongo-lanceolata, acutiuscula, hæc 1½—2 lin. longa, minute ciliolata; stamina 10, libera; ovarium 10-sulcatum.—*Pegu.*

CHAILLETIACEÆ.

24. CH. HELFERIANA, nov. sp.

Frutex scandens ? novellis flavescenti— v. canescenti-puberulis; folia elliptico-oblonga v. oblonga, petiolis 3—4 lin. longis canescenti-tomentosis, breve acuminata, basi acuta v. obtusa, integra, pergamacea præsertim dum juvenilia subtus secus costam marginesque adpresse pubescentia, nervis lateralibus tenuibus et inconspicuis; flores parvi, pedicellis brevibus et canescenti-pubescentibus, in cymulas v. corymbos parvos axillares canescenti-pubescentes pedunculo ¼-¾ pollicari crasso libero supportatos collecti; sepala petalaq꞉ extus sericea.—*Tenasserim.*

OLACINEÆ.

25. ANACALOSA PUBERULA, nov. sp.

Frutex magnus, glaber; folia 6—5 poll. longa, breve petiolata, oblonga ad ovato- et elliptico-oblonga, acuminata, basi acuta, integra, coriacea, glabra; flores parvi, pedicellis brevibus strictis puberulis, e pedunculo conico v. globoso brevi crasso minute bracteato orientes; calyx fulvescenti-puberulus; drupæ....—*Andamans.*

26. Cansjera parvifolia, nov. sp,

Partes novellæ, folia et inflorescentiæ pilis furcatis tomentellæ v. puberulæ; folia vulgo pollice breviora, ovata, basi rotundata v. obtusa, coriacea, emarginata v. obtusa, integra, utrinque petiolusque brevis tomentella; flores parvi, sessiles, calyce magis distincto, spicas breves axillares formantes; corolla puberula.—*Tenasserim.*

27. Stemonurus tomentellus, nov. sp.

Ramuli, petioli et inflorescentiæ fulvescenti-tomentellæ; folia 6—7 poll. longa, longiuscule et graciliter petiolata, oblongo— v. elliptico-lanceolata, abrupte et obtusiuscule acuminata, basi acuta, subcoriacea, integra, subtus puberula; flores parvi, sessiles, cymas 3—4-tomas, dense tomentosas, longiuscule pedunculatas axillares formantes; calyx hirsutus; corolla glabra; filamenta sursum elevata.—*Burma.*

28. Stemonurus ? crassipes, nov. sp.

Arbuscula 25—30 pedalis, glaberrima; folia 5—7 poll. longa, lanceolata ad oblongo-lanceolata, basi acuminata, petiolo 4—5 lin. crasso suffulta, obtusiuscula, pergamacea, glabra, opaca, subtus obscure colorata; flores parvi, pedicellis lin. longis, in cymas brevissimas (petioli longitudine) glabras paucifloras axillares collecti; calyx coriaceus, cupularis, obsolete dentatus; drupæ immaturæ obovatæ, pedunculo crassissimo 2—3 lin. longo sustentæ, apice truncato disco prominenter acuminato terminatæ, basi calycis limbo rupto angusto circumdatæ.—*Pegu.*

29. Apodytes Andamanica, Kurz in Andam. Rep. Append. B. 5.

Arbuscula glabra gemmis sparse puberulis; folia 7—8 poll. longa, breviuscule petiolata, elliptico-oblonga v. oblonga, acuminata, basi obtusa v. acuta et sæpius sub-obliqua, coriacea, glabra, opaca; flores parvi, subsessiles cymas breve et crasse pedunculatas densas puberulas axillares formantes; calyx puberulus, obsolete 5- raro 6-dentatus; petala extus puberula, lanceolata, apicibus acutis incurva; stylus brevis vix excentricus; drupæ semibaccatæ, pollicem circiter longæ; nux lignoso-fibrosus, ovato-oblongus, planoconvexus et subnavicularis, acumine inflexo terminatus, appendice crasso carnoso albo nucis superficiem totam planam obtegente; semina elliptica, compressa.—*Andamans.*

30. Sarcostigma edule, (*Chailletia edulis*, Kurz in And. Rep. App. B. 6).

Frutex scandens, glaber; folia elliptica ad oblonga, breviuscule petiolata, basi obtusa, coriacea, obtusiuscule apiculata, integra, glabra, utrinque crasse et eleganter reticulata; racemi, ferrugineo-tomentosi; drupæ inæquali-oblongæ, compressiusculæ, obtusæ, aurantiacæ, dense tomentellæ, pulpa tenui dulciusculo edibili.—*Andamans.*

31. Yodes Brandisii, nov. sp.

Frutex scandens tomentellus; folia 6 poll. longa, elliptico-oblonga, basi

obtusa, petiolis longiusculis gracilibus tomentosis, acuminata et costa excurrente mucronata, integra, membranacea, subtus inter nervos prominenter et laxe reticulata, supra secus nervos subtusque totâ paginâ tenui-tomentosa et viridia ; flores minuti, tomentosi, pedicellis brevibus sed gracilibus, paniculas laxas tomentosas geminas sub-oppositifolias formantes ; panicula una alterave v. ejusdem ramulus in cirrhum tortuosum transmutatus ; fructus....—*Tenasserim.*

ILICINEAE.

32. Ilex gaultheriæfolia, nov. sp.

Frutex glaber ; folia lineari-lanceolata, basin versus attenuata v. cuneata, breve crasseque petiolata, acuta, 3—3½ poll. longa, coriacea, serrata, nervis subtus conspicuis, glabra ; flores minuti, pedicellis glabris gracilibus, cymas breves graciles axillares petiolorum longitudine formantes ; calyx 5-lobatus, lobis lato-oblongis, obtusiusculis ; petala rotundata ; stamina 5, filamentis gracilibus, cum petalis alternantibus ; drupæ....—*Tenasserim.*

CELASTRINEAE.

33. Evonymus calocarpus, nov. sp.

Frutex ? glaber, ramulis teretibus ; folia textura et coloratione iis generis *Microtropis* simillima, elliptica v. oblongo-lanceolata, petiolis 3—4 lin. longis, breve et obtusiusculo acuminata, integra, subcoriacea, 4-6 poll. longa, subtus pallida ; flores... ; capsulæ cerasi fere magnitudine, pedunculo glabro brevi suffultæ v. subsessiles, vulgo obsoleto 4-lobæ et 4-valves, læves ; semina in loculis solitaria arillo rubescente induta.—*Tenasserim.*

34. Evonymus (Glyptopetalum) sclerocarpum, nov. sp.

Arbuscula 8—12 pedalis cortice rubra, glaberrima ; folia oblonga ad elliptico-lanceolata, petiolis 3—4 lin. longis crassis, basi acuminata, 6—8 poll. longa, coriacea, serrata, acuminata ; flores virescenti-purpurei, pedicellis longis gracilibus instructi, cymas pedunculatas laxas glabras solitarias v. per plures in foliorum axillis v. supra eorum delapsorum cicatricibus orientes formantes ; sepala alba, lato-orbicularia ; petala suborbicularia, concava, extus viridia, intus virescenti-purpurea exappendiculata ; stamina 4 ; antheræ in disco lato obsoleto 4-gono subsessiles ; stigma sessile, obsolete 4-gonum : capsulæ subglobosæ v. bilobæ, pisi majoris magnitudine, rimosæ, et verruculoso-scabræ ; arillus sanguineus.—*Pegu.*

35. Lophopetalum Wallichii, nov. sp.

Arbor magna, glaberrima ; folia oblonga ad elliptica, raro ovato-oblonga, petiolis 1—1½ pollicaribus, obtusa v. obtusiuscula v. acuta, basi rotundata, 4—6 poll. longa, integerrima, supra glaucescenti-viridia et nitentia, subtus opaca et inter nervos conspicuos laxe reticulata ; flores c. 3 lin. in diametro, pedicellis 2—2½ lin. longis albis glabris instructi ; paniculæ

axillares et terminales rigidiusculæ, virescenti-albidæ; petala virescenti-alba, nuda et integra; discus magnus, carnosus, luteus; stamina 5, deflexa, disco inserta; ovarium triquetrum, sanguineum; capsulæ c. 4 poll. longæ, v. longiores, 2 poll. latæ, 3-lobæ et 3-valves, valvis lævibus; semina compressa, imbricata, cum ala 2—2½ poll. longa, oblonga, alâ elliptico-oblongâ membranaceâ complete circumdata.—*Burma.*

36. Hippocratea fuscescens, nov. sp.

Frutex? glaber; folia oblongo-lanceolata v. oblonga, petiolis crassis 4—5 lin. longis, breve acuminata, basi acuta, 2½—3 poll. longa, coriacea, obsolete crenato-serrata, glabra, supra nitentia, in sicco fuscescentia v. nigrescentia; paniculæ cymosæ, glabræ, a basi ramosæ v. pedunculatæ axillares, foliis paulo breviores; flores parvi, circ. 2 lin. in diametro, pedicellis 1—1½ lin. longis, sepala minute eroso-ciliata; petala obovato-oblonga, concava, basin versus attenuata, lineam circiter longa, imbricata; antheræ 3, filamentis reflexis brevissimis disco elevato insertis; carpella....—*Tenasserim.*

37. Salacia grandiflora, nov. sp.

Frutex scandens, glaber, ramulis teretiusculis; folia elliptica ad elliptico-oblonga, apiculata, basi acuta, petiolis ½—¾ poll. longis crassissimis, integra et marginibus parum revolutis, 8—9 poll. longa, subcoriacea, glabra, utrinque nitentia, in sicco fuscescentia; flores conspicui; pedicelli crassi, 2 lin. longi, 2—4-ni, e tuberculis minute bracteolatis axillaribus v. lateralibus orti; sepala lato-rotundata, glabra, lin. circiter longa; petala sessilia, rotundata, 3—4 lin. longa; stamina 3, disco intus inserta, filamenta brevissima dilatata et reflexa; ovarium læve; stylus brevis; baccæ....—*Tenasserim.*

38. Salacia flavescens, nov. sp.

Frutex? glaber, ramulis teretiusculis; folia lanceolata, opposita v. alterna, petiolis 3—4 lin. longis crassis, utrinque acuminata, integra v. obsolete crenata, marginibus parum revolutis, tenuiter coriacea, 4—5 poll. longa, glabra, supra nitida, subtus pallida, in sicco lutescentia; flores minuti, albi? pedicelli 1—2 lin. longi, e tuberculis axillaribus v. lateralibus minute bracteatis orti; sepala oblongo-lanceolata, obtusiuscula; petala ¾ lin. longa, oblonga, obtusa; antheræ 3; filamenta disco intus inserta, brevissima, dilatata; ovarium læve; baccæ....—*Tenasserim.*

RHAMNEAE.

Apteron, nov. gen.

Calyx 5-fidus, tubo brevi obconico, lobis patentibus acutis. Petala 5, obovata, minuta, inter calycis lobos inserta. Stamina 5, petalis paullo longiora; filamenta filiformia. Discus planus, liber. Ovarium disco immersum, subglobosum, 2-loculare; stylus brevissimus, stigmatibus 2 brevibus. Dru-

pa (?) globosa, *Gouaniæ* more calyce aucto inclusa eidemque adnata, apice limbo coronata, abortu 1-locularis, monosperma? semina. ...Frutex scandens foliis serrulatis penninerviis. Flores parvi, fasciculati, paniculas racemosas formantes.

39. APTERON LANCEOLATUM, nov. sp.

Frutex magnus scandens, novellis tomentellis; folia lanceolata, petiolis 2—3 lin. longis crassis puberulis glabrescentibus, longe et obtusiuscule acuminata, serrata, chartacea, secus nervos fulvescenti-pubescentia mox glabrescentia, 4—5 poll. longa, utrinque nervis lateralibus numerosis (7—9) promimentibus percursa; flores parvi; pedicelli graciles v. crassiusculi, 1 lin. longi, puberuli, fasciculati v. subsolitarii, racemosi et paniculas terminales et axillares canescenti- v. flavescenti-tomentosas formantes; calyx dense v. parce puberulus, circiter $1\frac{1}{2}$—2 lin. in diametro; ovarium pubescens, stylo brevi bifido terminatum; drupa (?) adhuc nimis immatura globosa, grani piperis magnitudine, calyce aucto glabrescente limbo calycis coronato usque ad apicem fere inclusa.—*Tenasserim.*

40. SMYTHEA? CALPICARPA, nov. sp.

Frutex scandens? ramulis fulvo-pilosis; folia lanceolata, petiolis $\frac{1}{2}$—1 lin. longis crassis magis minusve pilosis, acuminata, serrata, chartacea, 4—$3\frac{1}{2}$ poll. longa, subtus secus costam pilosa, cæterum glabra; flores... ; capsulæ (immaturæ) $1\frac{1}{4}$ poll. longæ, oblongæ, apice oblique truncatæ, folliculis *Calpicarpi* non absimiles, dense fulvescenti pubescentes, coriaceæ.—*Tenasserim.*

41. COLUBRINA PUBESCENS, nov. sp.

Frutex scandens, habitu omnino *C. Asiaticæ*, novellis dense fulvo-pubescentibus; folia *C. Asiaticæ* sed juvenilia dense fulvo-pubescentia magis minusve glabrescentia; flores parvi, viridiusculi, pedicellis lin. longis gracilibus pubescentibus, cymas breves robustas fulvo-pubescentes axillares efformantes; semina minora, compressa.—*Pegu.*

AMPELIDEÆ.

42. VITIS ERYTHROCLADA, nov. sp.

Frutex alte scandens, ramulis teretibus fulvis novellisque parce pubescentibus; folia decidua, digitatim—5-foliolata, petiolis 4—5 pollicaribus glabris instructa; petiolulis 1—2 pollicaribus glabris gracilibus, lato-obovato-oblonga, 4—6 poll. longa, breve acuminata, basi acuta, serrata, membranacea, novella subtus secus nervos parce pubescentia mox glaberrima; cirrhi bifidi; stipulæ... ; flores parvi, virescenti-flavi, pedicellis $1\frac{1}{2}$—3 linearibus puberulis suffulti, cymulosi, cymam axillarem dichotomo-ramosam breviusculam laxam puberulam magis minusve glabrescentem formantes; calyx brevis, puberulus; petala et stamina 4; stylus simplex, subulatus; baccæ globosæ, cerasi magnitudine.—*Pegu, Martaban.*

43. VITIS ASSIMILIS, nov. sp.

Frutex alte scandens, glaber, ramis teretibus tuberculatis; folia petiolis teretibus 1—1½ poll. longis, constanter 3-foliolata; foliola petiolulis (—1 lin. long.) crassis instructa, oblongo-lanceolata (lateralia obliqua et altero latere basi rotundata) 3—4 poll. longa, acuta, crenato-dentata, coriacea, glabra; flores parvi, virescenti-albi, hermaphroditi, pedicellis lin. longis crassis dense fulvo-pubescentibus suffulti, cymam axillarem breve pedunculatam sæpius nutantem ramosissimam puberulam efformantes; petala 4; ovarium sursum in stylum brevem crassum attenuatum, stigmata 4, brevia, patentia.—*Martaban.*

44. VITIS CAMPYLOCARPA, nov. sp.

Frutex alte scandens, glaberrimus, ramis teretibus et cirrhis crassis oppositifoliis; folia digitatim 5—(—7?) foliolata, petiolis 2—3 poll. longis lævibus; foliola petiolulo ½—1½ pollicari geniculatim inserta, obovata, basi acuta sub-decurrentia (lateralia sub-obliqua), 4—6 poll. longa, abrupte acuminata, remote et leviter crenato-dentata, succulente coriacea, glabra; flores, ... in cymam dichotomo-ramosam brevissime pedunculatam v. subsessilem glabram axillarem collecti; baccæ oblongæ, ½ poll. fere longæ, subcurvatæ, læves et lucidæ, pedicellis lin. longis suffultæ, semen solitarium coffeiforme sulcatum transverse lineatum includentes.—*Pegu.*

45. VITIS WALLICHII, nov. sp.

Caulis teretiusculus, subherbaceus, glaber; folia simplicia, petiolis 2—3 pollicaribus glabris subangulatis, cordato-oblonga v. oblonga, basi 5-nervia, subtriloba, acuta, setaceo-serrata, membranacea, subtus in nervis parce puberula, 6—7 poll. longa; cymae axillares, parviusculæ, foliis multo breviores, pedunculatæ et pauciramosæ, glabræ; flores... ; baccæ pisi minoris magnitudine, globosæ, longe (4—5 lin.) et crasse pedunculatae, monospermæ. —*Ava.*

46. LEEA PUMILA, nov. sp.

Herba perennis pumila simplex dense fulvo-v. cinereo-pubescens; folia imparipinnata, adhuc juvenilia dense pubescentia; rachis et petiolus teretes, crassi; foliola juniora bijuga cum impari, petiolulis brevissimis crassis teretibus, ovato-oblonga, serrata, plicata, utrinque dense pubescentia v. subtomentosa; stipulæ magnæ, petiolo adnatæ, angustæ, extus tomentosæ; cymæ breves et compactiusculae, pubescentes, subsessiles v. pedunculo terete dense pubescente suffultæ, breviter ramosæ; flores (in alabastro) subsessiles; calyx tomentosus; petala extus puberula.—*Pegu.*

SAPINDACEÆ.

47. CUPANIA FUSCIDULA, nov. sp.

Arbor, partibus omnibus puberulis; folia vulgo abrupte pinnata v. impari pinnata; rachis ferrugineo—tomentosa, exalata; foliola c. 4 poll.

longa, alterna, inæqualia et subfalcata, oblongo-lanceolata, basi in petiolo brevissimo crasso subdecurrentia, apiculata, integra, chartacea, in sicco fuscescentia v. nigrescentia, utrinque (præsertim subtus) puberula; flores parvi, paniculas axillares ramosas ferrugineo-tomentosas folio breviores formantes; sepala oblongo-rotundata, ciliata et plerumque sparse hirtula; petala lato-oblonga, ciliata, squama supra ungue instructa bifida, intus lanata; stamina vix exserta; capsulae....—*Tenasserim.*

48. CUPANIA GLABRATA, nov. sp.

Arbuscula glabra, 25—30 pedalis; folia abrupte pinnata, brevius petiolata, glaberrima et lucida; foliola vulgo bijuga, lanceolata v. oblongo-lanceolata, utrinque acuminata, 4—7 poll. longa, integra, subcoriacea, laxe sed prominenter reticulata; flores parvi, albi, pedicellis lin. longis instructi, pauci fasciculati, paniculam axillarem glabram simplicem v. compositam racemiformem efformantes; sepala 5, rotundato-obovata, exteriora 2 majora lin. fere longa, glabra, villoso-ciliata; petala totidem, c. ½ lin. longa, spatulato-linearia, extus glabra, intus dense albo-lanuginosa; ovarium fulvescenti-hirsutum.—*Pegu, Martaban,*

49. NEPHELIUM GRIFFITHIANUM, nov. sp.

Arbor, gemmis fulvescenti-velutinis; folia glabra, impari-pinnata, petiolis glabris 2—3 poll. longis glaucescentibus; foliola 3—4 juga cum impari, breve petiolulata, ovato-oblonga ad oblonga, basi inæquali obtusa v. subobtusa breve acuminata, chartacea, subtus glauca, reticulatione utrinque conspicuâ et prominente; flores...; fructus (racemosi teste Griffithii) abortu 1-lobati, subsessiles, oblongi, ovi gallinacei parviusculi magnitudine, murici bus angulato-compressis conicis ½ poll. fere longis tecti, semen unicum magnum arillo succulento albo indutum includentes.—*Ava.*

ZOLLINGERIA, nov. gen.

Calyx 5—partitus, sepala decidua, inæqualia, imbricata, interiora 2 majora. Petala totidem, subunguiculata, basi squamâ obtusa petalorum dimidio breviori lanuginosa instructa. Stamina 8, disco obsoleto intus inserta; filamenta non exserta, longa et gracilia; antheræ ovales, 2-loculares, loculis 2-locellatis obtusis. Ovarium triquetrum, conicum, in stylum triquetrum simplicem tridentatum attenuata, 3-loculare, loculi uniovulati, ovulum a medio axis centralis suspensum. Capsulæ magnæ, chartaceæ, maceratione dissepimentorum vulgo 1-loculares, 3- v. abortu nonnunquam 2-alatæ, septicide dehiscentes, semen solitarium v. duo continentes. Seminum testa membranacea, cotyledones magnæ, virides, plicatæ. Albumen nullum. Arbores sæpe magnæ deciduæ foliis impari-pinnatis foliolisque integris. Flores parvi, albi, in paniculas breves sæpius compositas axillares collecti.

50. ZOLLINGERIA MACROCARPA, n. sp.

Arbor usque 80 pedalis, novellis fulvo-puberulis; folia vulgo impari-rarius subabrupte pinnata, glabra; foliola alterna, basi magis minusve

inæqualia, petiolulis 2—3 lin. longis suffulta, lanceolata ad oblongo-lanceolata, obtusiuscule acuminata, 5—8 poll. longa, chartacea, integra, laxe reticulata; flores albi, pedicellis 2 lin. longis, paniculas iis *Dodonaeæ* similes breves subnutantes obsolete puberulas axillares v. terminales formantes; sepala lin. circiter longa, obovata, ciliolata, subemarginata; petala 2 lin. longa, ciliata oblonga, obtusa, basi unguiculata squamâ lanatâ obtusâ auctâ; filamenta pubescentia; ovarium basi parce pubescens; capsulæ 2 poll. circiter longæ, oblongæ, glabræ, 3 v. raro abortu 2-alatæ, alis latis striatis basi angustatis rotundatis apice subtruncatis.—*Prome.*

51. ACER ISOLOBUM, nov. sp.

Arbor magna, glabra; folia 5—6 poll. longa et lata, basi rotundata, longe petiolata, 3-loba, lobis patentibus acuminatis, utrinque glabra, 3-nervia et reticulata; flores et fructus ignoti.—*Martaban.*

SABIACEÆ.

52. SABIA VIRIDISSIMA, n. sp.

Frutex glaberrimus; folia obovato- ad elliptico-lanceolata, petiolis 6—8 lin. longis, utrinque acuminata, membranacea, glabra, 6—8 poll. longa; flores parvi, albi, pedicellis c. 3 lin. gracilibus dein sursum incrassatis suffulti, paniculas 1 v. 2 laxas breves glabras axillares efformantes; calyx glaber, segmentis ovatis obtusis; petala 2-lin. fere longa; stylus 3-fidus, stigmatibus hippocrepiformibus; fructus....—*Andamans.*

ANACARDIACEÆ.

53. BUCHANANIA LAXIFLORA, nov. sp.

Arbor decidua, novellis canescenti-tomentosis; folia ovato-oblonga, basi obtusa, 6—7 poll. longa petiolo crasso semipollicari, coriacea, integra, tomentella, supra glabrescentia; flores minuti, pedicellis brevibus sed gracilibus suffulti, in paniculam terminalem laxam diffusam ramosissimam canescenti v. fulvescenti-pubescentem collecti; bracteæ minutæ, subulatæ; calyx canescenti-puberulus, lobis oblongis acutis vix ¼ lin. longis; petala obovato-oblonga, vix lineam longa; filamenta subpuberula; ovarium glabrum.—*Martaban.*

54. SEMECARPUS SUBRACEMOSA, nov. sp.

Fruticosa? novellis fulvo-puberulis; folia verosimiliter decidua, distantia, oblonga v. oblongo-lanceolata, obtusa v. obtusiuscula, basi in petiolum latum ½—1 poll. longum glabrum subdecurrentia, c. 3—4 poll. longa, integra, tenui-chartacea, supra glaucina, glabra et nitentia, subtus glauca et dum juvenilia minute puberula, dein in costâ crassâ nervisque parallelis anastomosantibus puberula, reticulatione laxâ et conspicuâ interjecta; flores parvi, pedicellis brevissimis dense puberulis suffulti, fasciculato-cymulosi, paniculam gracillimam puberulam v. subpubescentem axillarem et ramorum

apices terminantem ramosam formantes ; calyx puberulus ; petala 5, lineam circiter longa, valvata ; stamina 5. omnia fertilia, filamentis capillaribus ; discus hispido-tomentellus ; ovarium glabrum stylis 3 crassis apicibus capitato-stigmatosis coronatum ; nux....—*Pegu.*

55. HOLIGARNA GRAHAMII (Semecarpus Grahamii, Wight, Fc. t. 235). Arbor 20—30 pedalis, novellis pubescentibus ; folia 1—2½ ped. longa, elongato-obovato-lanceolata, basi cuneato-acuminata, petiolo ½—1 poll. longo crasso utrinque appendicibus barbæformibus geminis augmento, breve acuminata, integra, coriacea, juvenilia molli-pubescentia, dein supra glabrescentia subtusque glaucescentia et obsolete puberula ; flores parvi, subsessiles, dense ferrugineo-tomentosi, paniculas breviusculas dein elongatas dense ferrugineo-tomentosas axillares efformantes ; bracteolæ lineares, intus glabræ, deciduæ ; calycis lobi lanceolati, utrinque ferrugineo-pubescentes, pedicelli brevissimi sub fructu usque ad ½ poll. long. elongati ; nucis elliptico-obovatæ monospermæ pars summa tantum exserta.—*Pegu, Martaban.*

CONNARACEÆ.

56. ELLIPANTHUS CALOPHYLLUS, Kurz, Andam. Rep. Append. B. 6.

Arbuscula 20—30 pedalis glabra gemmis fulvo-pubescentibus ; folia unifoliolata, petiolis glabris pollicaribus suffulta ; foliola brevissime et crasse petiolata, ovato-oblonga v. oblonga, obtusiuscule acuminata, 5—6 poll. longa, subcoriacea, integra, glaberrima, nervis subtus rubescentibus, utrinque crebre et eleganter reticulata ; flores mediocres, pedicellis strictis brevibus dense puberulis geniculatis ; racemi vix pollicares, dense fulvo-puberuli ; petala lineari-oblonga, dense tomentella, plus quam 3 lin. longa ; folliculi oblique oblongi, in stipitem brevem et crassum attenuati, apiculati, compressiusculi, pollicem circiter longi, velutino-tomentosi, coriacei, intus glabri. *Andamans.*

57. ELLIPANTHUS TOMENTOSUS, nov. sp.

Arbuscula ramulis dense fulvo-tomentosis ; folia unifoliolata, petiolis circ. semipollicaribus dense fulvo-pubescentibus ; foliola oblonga ad oblongo-lanceolata et lanceolata, breve obtuseque acuminata, 4—6 poll. longa, integra, coriacea, supra glabra, nitentia et eleganter reticulata, subtus plus minusve fulvo- v. flavescenti-tomentosa, nonnunquam glabrescentia ; flores parviusculi, pedicellis tomentosis brevissimis crassis geniculatis instructi ; racemi breves, tomentosi, axillares, ramosi, sæpius paniculæformes ; petala oblonga, obtusa, dense tomentella, 2 lin. circiter longa ; folliculi oblique oblongi, apiculati, compressiusculi, bipollicares, in stipitem longiusculum crassum attenuati.—*Pegu, Martaban, Tenasserim, Siam.*

ROSACEÆ.

58. Pygeum persimile, nov. sp.

Arbor, novellis parce adpresse pubescentibus v. puberulis; folia elliptica ad elliptico lanceolata, petiolo 3 lin. longo gracili ferrugineo-pubesconti suffulta basi obtusa æqualia v. subæqualia, obtuse et sæpius longissime acuminata, integra, submembranacea, supra glabra v. secus nervos impressas minute tomentella, subtus secus costam adpresse pubescentia; racemi sublanuginoso-tomentosi, bini v. terni supra foliorum delapsorum cicatricibus v. irregulariter e ramis orientes; pedicelli brevissimi, semilineam longi; calycis tubus brevis, urceolatus, fulvo-tomentosus; ovarium dense fulvo-hirsutum; stylus longe exsertus stigmate lato. *P. Lampongo, Miq.*, proximum.—*Tenasserim.*

59. Pirus Karensium, nov. sp.

Arbuscula 25—30 pedalis, glabra; folia oblonga ad ovato-oblonga, basi inæqualia, petiolo c. pollicari glaberrimo, acuminata, 4—5 poll. longa, subcoriacea, apicem versus crenato-dentata, glabra; flores... ; poma cerasi majoris magnitudine, globosa, iis *P. Pashiæ* subconformia et leucosticta, maturescentia purpureo-atra, pedicellis brevissimis crassis suffulta, in paniculam depauperatam robustam glabram terminalem v. in axillis foliorum superiorum lateralem disposita.—*Martaban.*

60. Eriobotrya ? macrocarpa, nov. sp.

Arbor 30—40 pedalis, glabra; folia obovato- ad oblongo-lanceolata, basi in petiolum $\frac{1}{2}$—$\frac{3}{4}$ poll. longum crassum attenuata, breve et obtuse acuminata, integerrima, 5—6 poll. longa, coriacea, lævissima et lucida; flores... ; pedunculi fructigeri crassissimi et simplices, 1—2 poll. longi, glabri, ex axillis foliorum superiorum orientes v. in ramulis crassis terminales; fructus magis minusve globosi, cerasi majoris magnitudine, glabri, calycis limbo coronati. —*Pegu.*

COMBRETACEÆ.

61. Combretum tetragonocarpum, nov. sp.

Frutex scandens glaber; folia petiolo crasso lin. longo suffulta, oblonga ad elliptico-oblonga, obtusa v. subretusa, chartacea, utrinque conspicue nervosa et reticulata, glabra, 3—5 poll. longa; spicæ robustæ, fulvo-villosæ, solitariæ, foliis breviores v. æquilongæ, axillares v. in paniculas terminales brachiatas depauperatas dispositæ; flores parvi, albidi, bracteola parva subulata villosa sustenti; calyx cupulari-infundibuliformis cum tubo ovali brevi ferrugineo-villosulus; limbus intus dense villosus, extus pubescens et lepidotus, 4-dentatus, dentibus brevibus acutis; petala minuta; fructus pollicem longi v. longiores, glabri, pallide brunnei, elliptico-ovati, 4-angulati, angulis crassis coriaceis et sub-alato-prominentibus, nucis diametro multo angustioribus.—*Pegu.*

MELASTOMACEÆ.

62. MEMECYLON ELEGANS, nov. sp.

Frutex glaberrimus ramulis sub 4-alatis v. lineis 4 decurrentibus magis minusve obsolete elevatis notatis ; folia oblonga ad ovato-oblonga, basi in petiolum 2—3 lin. longum attenuata, obtusa v. subretusa, 3—4 poll. longa, coriacea, nervis lateralibus teneris in statu juvenili tantum visibilibus, glabra ; flores azurei, pedicellis 2—3 lin. longis suffulti, cymam umbelliformem simplicem vel trichotomam pedunculo ½—¾ poll. longo acute tetragono suffultam efformantes, et binæ v. solitariæ ex foliorum axillis v. supra foliorum delapsorum cicatricibus orientes ; ramificationes brevissimæ v. sub-reductæ ; calyx lævis, 1½ lin. fere in diametro, parte adnatâ hemisphericâ parvâ, limbus latus et explanatus, undulatus et obsolete lobatus, intus radiato-plicatus, plicis subnerviformibus ; petala, baccæ &c. desiderantur.—*Andamans.*

63. MEMECYLON PULCHRUM, nov. sp.

Frutex glaberrimus ramulis sub-teretibus ; folia larga, sessilia, lato ovato-oblonga, basi rotundata v. subcordata, obtusa v. paulo obtuse producta et subretusa, 5—6 poll. longa, crasse coriacea, nervis venisve haud visibilibus, glabra, supra lucida ; flores azurei, pedicellis ½—2½ lin. longis teretibus, depauperato-umbellulati, cymam ampliusculam pedunculo compresso 4-gono ½—1 poll. longo suffultam formantes, vulgo ternæ v. 4-næ supra foliorum delapsorum cicatricibus orientes ; bracteæ distinctæ, ovato-lanceolatæ, acutæ ; calyx campanulatus, c. 1 lin. in diametro, lævis, limbus truncatus, intus radiato-plicatus ; petala, baccæ etc. desunt.—*Andamans.*

LYTHRARIEÆ.

64. LAGERSTRŒMIA HYPOLEUCA, Kurz in And. Rep. 1868, Append. p. VIII.

Arbor vasta 60—70 pedalis glaberrima ; folia lanceolata ad ovato-lanceolata, basi in petiolum brevem decurrentia, acuminata, integra v. undulata, chartacea, 6—8 poll. longa, subtus albido-glauca ; flores mediocres, 1—1½ poll. in diametro, lilacini, pedicellis articulatis albido-puberis instructi, solitarii v. in cymas depauperatas breve pedunculatas minute canescenti-puberas collecti et paniculam elongatam terminalem formantes ; calyx in alabastro turbinatus, pubescentia subvelutina minutâ albescens, sulcato 10-costatus, costis alternantibus in 5 lobos triangulares minute mucronatos excurrentibus ; petala oblonga, undulata, ½ poll. longa ; capsula oblonga, mucronata, lignæ, c. ⅝ poll. longa.—*Andamans.*

65. LAGERSTRŒMIA CALYCULATA, nov. sp.

Arbor vasta, 60—70 pedalis, novellis tomentosis ; folia oblonga, acuminata, basi inæquali rotundata et in petiolum brevem subdecurrentia,

5—7 poll. longa, subcoriacea, supra glabra et minute reticulata, subtus puberula et inter nervos prominentes crasse reticulata; flores...; paniculæ ferrugineo— v. fulvo-tomentosæ, terminales, e racemis longioribus v. brevioribus compositæ; calyx fructigerus cupulari-campanulatus, capsulam arcte amplectens, 2—2½ lin. altus, teres, absque costis v. sulcis dense ferrugineo-tomentosus, pedicello brevissimo crasso instructus, 6-lobatus, lobis brevibus triangularibus reflexis planis acutis; capsula oblonga, mucronulata, lucida, pro ½—⅔ parte e calyce protrusa, 6-locularis et -valvis, 3—4 lin. longa. —*Martaban.*

SAMYDACEÆ.

66. Homalium minutiflorum, nov. sp.

Arbor glabra; folia oblonga, petiolo 3—4 lin. longo crasso, obtuse apiculata, 3—5 poll. longa, grosse crenata, tenuiter coriacea, glabra; flores minuti, ¼ lin. circ. in diametro, pedicellis brevibus filiformibus glabris instructi, fasciculati, racemos solitarios v. binos axillares simplices v. parce ramosos glabros formantes; calyx glaber, segmentis oblongo-linearibus villoso-ciliatis; filamenta gracillima, singula petalis opposita.—*Martaban ?*

CUCURBITACEÆ.

67. Trichosanthes macrosiphon, nov. sp.

Herba volubilis parce et minute puberula; folia cordato-ovata, petiolo 1½—2 pollicari puberulo, 6—8 poll. longa, basi sinuato-cordata, obsolete remote repando-dentata, sæpius in lobos 2 laterales acuminatos producta, acuminatissima, herbacea, glabra, subtus sparse et minute puberula; flores masculi desunt; feminei solitarii, axillares, pedicello puberulo brevi instructi; calyx puberulus, supra ovario in tubum 1½ poll. longum gracilem attenuatus, dentes lineari-subulati, puberuli; petala fimbriata.— *Tenasserim.*

BEGONIACEÆ.

68. Begonia flaccidissima, nov. sp.

Herbula flaccidissima tenera caulescens, 4—5 pollicaris, minute et sparse pubescens; folia alterna, cordato-orbicularia, obtusa, petiolo 2—3 poll. longo gracili sparse pubescente, c. 2 poll. longa et lata, grosse crenato-dentata et sublobata, tenerrime membranacea et flaccida, utrinque pilis minutis teneris adspersa; stipulæ oblongæ, hyalinæ, obtusæ, c. 2 lin. longæ; flores parvi, albi, pedicellis capillaribus instructi, cymas dichotomo-ramosas sparse et minute pubescentes pedunculo petioli dimidio longitudine axillari gracili suffultas formantes; bracteæ minutæ, lineares; sepala in maribus 2, rotundato-ovata, c. 2½ lin. longa; petala nulla; perianthii lobi fl. femin. 4, sepalis subconformia; stamina numerosa, subobovata, filamenta usque ad medium fere in columnam brevem gracilem connata; styli 2, a basi liberi, apice in laminam concavam semilunatam stigmatifero-marginatam dilatati;

ovarium sparse et crispato-pilosum, 2-loculare, ovatum, acuminatum; capsulæ....—*Tenasserim.*

UMBELLIFERÆ.

69. PIMPINELLA PARISHIANA, nov. sp.

Herba humilis 1—2 pedalis pilis brevibus adspersa; folia ternatisecta, petiolo basi vaginante, foliola cordato-ovata, magis minusve 3- lobata, acuminata, grosse duplicato-serrata, 3—3½ poll. longa, pilis brevibus albis adspersa, foliola lateralia petiolulo subpollicari, medianum petiolulo sub 2—pollicari suffulta, folia superiora sensim minora, integra et supra petiolum vaginantem sessilia; flores albi, pedicellis 2 lin. longis strictis puberulis inserti, involucellato umbellulati, umbellam involucratam compositam formantes; involucri et involucelli foliola linearia, longa, et sæpius apicem versus in dentes 2 laterales producta; fructus....—*Tenasserim.*

70. HERACLEUM BARMANICUM, nov. sp.

Herba robusta annua 4—6 pedalis, caulibus hirsutis; folia caulina superiora ternatipinnata, foliola lateralia ovato-lanceolata, sessilia, grosse serrata et sæpe in lobum lateralem producta, foliolo terminali petiolato decurrenti 3-lobo serrato-lobato; involucri foliola linearia, brevia; mericarpia 3 lin. circiter longa, elliptico-oblonga, lato-marginata.—*Pegu.*

LORANTHACEÆ.

71. LORANTHUS HYPOGLAUCUS, nov. sp.

Frutex parasiticus glaberrimus; folia opposita v. subopposita, lanceolata ad elliptico-lanceolata, in petiolum brevem attenuata, magis minusve acuminata, integra, 2½—3 poll. longa, coriacea, nervis lateralibus vix conspicuis, glabra, subtus glauca; flores ½—1⅓ poll. longi glabri, pulcherrime coccinei, pedicellis 2 lin. longis instructi, geminatim v. ternatim pedunculis brevibus glabris suffulti et fasciculos 2 v. plures axillares formantes; bractea et bracteolæ 2 parvæ, triangulari-ovatæ, basi unitæ; calyx glaber, cylindricus, limbo integro truncato; corolla glabra, tubo curvulo et leviter ampliato, limbo profunde 6-fido, lobis linearibus reflexis; stamina 6; antheræ lineares; filamenta stylusque gracillimus, filiformis, glabri; baccæ....—*Martaban.*

72. GINALLOA ANDAMANICA, nov. sp.

Frutex parasiticus glaberrimus ramis dichotomo-ramosis; folia opposita, obovalia ad ovali-oblonga, basi subobliqua in petiolum brevissimum crassum planum contracta, apice rotundata, integra, subundulata, crasse coriacea, nervis 3—5 in sicco vix conspicuis, 1½—2 poll. longa, glabra; flores minuti, dioici? sessiles, terni v. quaterni (v. plures?) separatim in rhachidis crassæ geniculis dilatatis quasi involucrantibus immersi; spicæ 1—4 pollicares, robusti, glabri, e furcationibus ramorum orientes, v. terminales; calycis limbus obsoletus v. nullus?; petala 3, minuta, 3-angularia, conniventia?;

stigma obsolete conicum, parvum; baccæ immaturæ elongato-ovatæ, læves, truncatæ v. petalis diutius persistentibus coronatæ.—*Andamans.*

RUBIACEÆ.

73. WENDLANDIA GLOMERULATA, nov. sp.

Arbor v. frutex? novellis indistincte puberulis; stipulæ foliaceæ, cordatæ; folia lineari-lanceolata ad lanceolata, in petiolum brevissimum 1—3 lin. longum puberulum attenuata, longe acuminata, 3—4 poll. longa, integra, membranacea, glabra, subtus secus costam minute adpresse pubescentia; flores...sessiles, in fasciculos breve pedunculatos* congregati et paniculam terminalem parce pubescentem brachiatam formantes; calyx fructiger adpresse pubescens, dentibus lineari-lanceolatis apparenter tubo longioribus; capsulæ globosæ, lineam vix longæ, pubescentes.—*Tenasserim.*

74. WENDLANDIA SCABRA, nov. sp.

Arbor scabro-pubescens; stipulæ cordato-reniformes, semiamplexicaules; folia obovato-elliptica ad elliptica, basi acuta v. acuminata, petiolo ½—⅔ longo brevi pubescente instructa, breve et obtuse acuminata, 3—4 poll. longa, integra, membranacea, utrinque scabro-puberula; flores minuti, albi, sessiles, in spiculas congregati et paniculam amplam puberulam brachiatam terminalem formantes; calyx adpresse hispidus, semilineam vix longus, dentibus parvis, 3 angulari-acutis; corolla glabra, 1—1½ lin. longa, lobis brevibus; capsulæ globosæ, ½ lin. in diametro, minute adpresse hispidæ.—*Ava.*

75. ARGOSTEMMA SONERILOIDES, nov. sp.

Herba annua succulenta cauli simplici apice folioso plus minusve villosulo; folia subverticillata, ovata ad subcordata, petiolo brevissimo crasso villoso, 1—2½ poll. longa, acuta v. obtusiuscula, utrinque pilis brevibus albis adspersa et subtus secus nervos pubescentia; flores parvi, pallide rosei v. albi, pedicello lineari villoso instructi, umbellam parvam villosam v. cymam umbellatam pedunculo 1—½ pollicari villoso terminali sustentam formantes v. rarissime solitarii v. subsolitarii; bracteæ vulgo majusculæ, 2—4-nae involucra specialia efformantes; calyx villoso-pubescens, 3 lobus, lobis latotriangularibus; corolla subcampanulata, 3-loba, lobis lineam tantum longis; antheræ oblongæ, obtusæ.—*Pegu*; *Andamans.*

76. SPIRADICLIS BIFIDA, nov. sp.

Herba annua erecta parce ramosa 1—1½ pedalis, caulibus puberulis; folia obovato-lanceolata, basi cuneata et in petiolum ¼—½ pollicarem magis minusve pubescentem decurrentia, 2—5 poll. longa, breve acuminata, integra membranacea, glabra v. subtus secus nervos puberula; flores minuti, albi, sessiles, in spicas longiores v. breviores bifidas collecti et in paniculam plus minusve puberulam elongatam terminalem dispositi; capsulæ globoso-2-lobæ, lin. circiter in diametro.—*Martaban.*

77. OPHIORHIZA GRACILIS, nov. sp.

Herba annua, erecta, simplex ½—1 pedalis, glaberrima ; folia oblongo-lanceolata ad lanceolata, basi acuminata, petiolo gracili ½—1 poll. longo, longe acuminata, 3—5 poll. longa, integra, membranacea, glaberrima, subtus pallida ; flores parvi, albi, pedicellis brevissimis instructi et sessiles, spicam secundam bifidam formantes et in cymam longe pedunculatam terminalem glaberrimam gracilem dispositi ; bracteæ et bracteolæ lineari-subulatæ, parvæ ; corolla glabra, tubo circa 3- lineari, lobis obtusis.—*Tenasserim.*

78. HEDYOTIS ANDAMANICA, nov. sp.

Herba annua subsimplex v. ramosa erecta, ½—1 pedalis, ramis minute puberulis ; stipulæ latæ, apice longifimbriatæ, puberulæ ; folia variabilia, ovata ad oblonga et obovata, basi acuta v. in petiolum 1—3 lin. longum puberulum attenuata, membranacea, 1—2 poll. longa, obtusa v. subobtusa, sæpius cum mucrone, integra v. undulata, subtus secus nervos minute puberula ; flores parvi, albi, subsessiles, glomerati ; capitula pedunculo longo, solitaria, v. vulgo in cymam laxam trichotomam puberulam disposita, axillaria et terminalia ; calyx subglaber, lobis linearibus lineam fere longis et calycis tubo longioribus ; capsulæ compresso-didymæ, semiorbilucares, circ. 2 lin. in diametro, pilis adpressis minutis adspersæ, carinis 4 nonnunquam subuliformibus notatæ et calycis lobis lanceolatis longis coronatæ.—*Andamans.*

79. WEBERA GLOMERIFLORA, nov. sp.

Arbuscula 20—30 pedalis, glabra v. gemmis pubescentibus ; stipulæ caducæ ; folia obovato-lanceolata ad elliptico-lanceolata, basi acuminata, petiolo 2—4 lin. longo glabro, 3—4 poll. longa, acuta v. apiculata, integra, crasse membranacea, glabra, crassinervia ; flores subsessiles, in cymam terminalem subsessilem pubescentem conglomerati ; calyx pubescens ; corolla... ; baccæ atræ, globosæ v. ovoideæ, pisi minoris magnitudine, læves, basi calycis limbi coronatæ, pedicello lineam circiter longo suffultæ.—*Pegu.*

80. GARDENIA ERYTHROCLADA, nov. sp.

Arbuscula rigida 15—25 pedalis, trunco ramisque lateritiis et spinis oppositis (ramulis reductis) armatis, novellis pubescentibus ; stipulæ caducissimæ ; folia obovato- ad cuneato-obovata, basi sæpius inæquali in petiolum ½—1 poll. longum pubescentem decurrentia, 4—6 poll. longa, obtusa, integra v. subintegra, membranacea, utrinque (præsertim subtus) pubescentia ; flores viridiusculi, dimorphi, fertiles in individuis iisdem v. separatis solitarii, sessiles v. subsessiles, apicibus ramorum abbreviatorum crassorum terminantes, fl. hermaphrodito-steriles pedicellis longis gracilibus pubescentibus instructi, fasciculos sessiles v. breviter pedunculatos terminales v. subaxillares formantes ; calyx pubescens, tubo in fl. fertilibus magis evoluto, lobis foliaceis, obovatis, 4—6 lin. longis ; corolla pubescens, tubo brevi amplo ; baccæ florum fertilium sessiles, ovi anatis magnitudine, ovoideæ, scabrescentes, brunneæ ob-

solete-costatæ; cæ fl. sterilium pedunculo $1\frac{1}{2}$—2 poll. longo stricto brunneo-pubescente suffultæ, cerasi minoris magnitudine, magis minusve globosæ, calycis limbo magno foliaceo coronatæ.—*Ava, Pegu.* &c.

81. GARDENIA DASYCARPA, nov. sp.

Arbuscula rigida spinis oppositis longis strictis armata, 12—15 pedalis, novellis villoso-pubescentibus; stipulæ deciduæ; folia obovato-oblonga, basi acuta v. acuminata, petiolo 1—2 lin. longo instructa, 1—2 poll. longa, integra, obtusa v. acuta, coriacea, supra retrorse puberula, subtus adpresse villoso-pubescentia; flores...sessiles, solitarii e ramulorum crassorum verruciformium apicibus; baccæ globosæ, corticosæ, pomini mayoris magnitudine, calycis limbo tubulari coronatæ.—*Prome, Tenasserim.*

82. GARDENIA HYGROPHILA, nov. sp.

Fruticulus 1—3 pedalis, ramis sæpius diffusis, glaberrimus; stipulæ connatæ, glabræ v. sparse hirsutæ; folia obovata ad obovato- et elliptico-oblonga, basi acuta, petiolo 2—3 lin. longo gracili, obtusa v. acuta, 2—$2\frac{1}{2}$ poll. longa, integra, membranacea, supra lucida, glabra; flores mediocres, albi, in sicco nigrescentia, subsessiles, solitarii ex apicibus ramulorum v. in eorum furcationibus; calyx glaber v. parce adpresse pubescens, 4 lin. fere longus, limbo campanulato, 5-fido, lobis lineari-lanceolatis acuminatis sparse ciliatis; corolla lineam circiter longa, subirregulari-campanulato-infundibuliformis, lobis inæqualibus c. $\frac{1}{2}$ poll, longis; baccæ.......—*Pegu, Siam.*

83. GARDENIA PULCHERRIMA, nov. sp.

Arbor 30—35 pedalis, glabra; stipulæ lato-triangulares,liberæ v. subliberæ; folia lato- ad oblongo-lanceolata v. elliptico-oblonga, basi acuta, petiolo crasso 3—4 lin. longo, 3—5 poll. longa, breve acuminata, integra, coriacea, glaberrima, subtus in nervorum axillis glandulosa; flores magni et speciosi, pedicello 2—3 lin. longo bracteato tomentoso instructi, terni v. plures cymam breve pedunculatam fulvescente tomentosam in ramulorum furcationibus v. pseudo-axillarem formantes; calyx c. 3—$3\frac{1}{2}$ lin. longus, tomentosus, limbo amplo 5-dentato, dentibus ovatis acutis; corolla glabra, alba, intus in fundo roseo-punctata, $1\frac{1}{2}$ poll. longa, v. paullo longior, supra tubo brevissimo ventricoso-efflata; baccæ globosæ, aurantii minoris magnitudine, corticosæ et scabræ, brunneæ, calycis limbo coronatæ.—*Andamans.*

84. ACRANTHERA UNIFLORA, nov. sp.

Herba perennis 4—6 poll. alta v. altior, parce pubescens; folia ovalia ad ovali-lanceolata, basin obtusam v. rotundatam versus attenuata, petiolo gracili pubescente suffulta v. superiora subsessilia, 1—$1\frac{1}{2}$ poll. longa, membranacea, obtusiuscula v. acuta, integra, supra parce adpresse hirsuta, subtus secus nervos sparse pubescentia; flores majusculi, albi, solitarii, sessiles v. subsessiles, terminales; calyx fulvo-adpresse-hirsutus, tubo 2 lin. fere longo, lobis linearibus, 2—$2\frac{1}{2}$ lin. longis; corolla hypocraterimorpha, tubo pollicem fere longo, adpresse pubescente, lobis dimidio longis elliptico-ovatis

acutis ; stylus profundo bifidus ; baccæ ellipticæ, pisi magnitudine, hirsutissimæ, calycis lobis linearibus terminatæ.—*Tenasserim.*

85. UROPHYLLUM BILOCULARE, nov. sp.

Arbor 25—30 pedalis, glabra ; stipulæ e basi lata subulato-acuminatæ. parce adpresse pubescentes ; folia oblongo-lanceolata ad lato-lanceolata, basi acuminata, petiolo 1—2 lin. longo suffulta, obtuse acuminata, 4—5 poll. longa, integra, chartacea, glabra ; flores minuti, sessiles, in fasciculos parvos axillares collecti ; calyx (in alabastro) truncatus, minute puberulus ; baccæ globosæ, aurantiacæ, pisi minoris magnitudine, obsolete bilobæ, calycis limbo brevi coronatæ, 2-loculares ; semina in loculo singulo 3—4, nigra, majuscula, placentæ centrali medio affixa.—*Martaban.*

86. MORINDA LEIANTHA, nov. sp.

Arbuscula ? scabrido-pubescens ; stipulæ ovato-lanceolatæ, acuminatæ, scabræ ; folia oblongo-lanceolata ad lanceolata, basi acuta v. acuminata, petiolo scabro 1—1½ poll. longo suffulta, 5—8 poll. longa, acuminata, integra v. subintegra, chartacea, utrinque præsertim subtus scabrido et parce pubescentia ; flores albi, majusculi, sessiles, in capitula parva oblonga pedunculata solitaria v. pluria ex axillis foliorum superiorum orientia v. terminalia conglomerati ; calyx truncatus ; corolla hypocraterimorpha, glabra, fauce glabra, tubo gracili ¾ poll. circiter longo, lobis ovato-lanceolatis ; baccæ...... —*Tenasserim.*

87. MORINDA WALLICHII, nov. sp.

Arbuscula ?, glaberrima ; stipulæ... ; folia oblongo-lanceolata ad oblongo-linearia, utrinque acuminata, petiolo ½—1½ poll. longo, 3—5 poll. longa, integra, crasse membranacea, glabra, subtus pallida ; flores parviusculi, albi, terni v. quaterni in capitula parva cymam terminalem glabram stricte pedunculatam formantia collecti ; calyx truncatus ; corolla glabra, tubo (in alabastro) ¼ poll. longo, lobis æquilongis, oblongo-linearibus obtusiusculis. —*Tenasserim.*

88. PSILOBIUM CAPILLARE, nov. sp.

Arbuscula 20—25 pedalis, glaberrima, lucida ; stipulæ acuminatæ, rigidæ ; folia variabilia, iis *Pavettæ parvifloræ* similia, lanceolata ad oblongo-lanceolata et elliptico-oblonga, basi acuta, petiolo brevissimo 1—3 lin. longo suffulta v. subsessilia, magis minusve acuminata v. subobtusa, 3—5 poll. longa, integra v. undulata, rigide sed tenui coriacea, utrinque lævia et lucida ; flores parvi, albidi, sessiles v. subsessiles, pauci v. numerosi in capitulum parvum basi bracteis paucis lineari-subulatis rigidis involucratum pedunculatum congregati ; pedunculi axillares v. supra-axillares, solitarii, stricti, graciles v. capillares, 1—2 poll. longi, sursum sensim incrassati ; calyx lineam circiter in diametro, cupularis, 4-dentatus, dentibus triangularibus ciliolatis ; corolla brevis, hypocraterimorpha, fauce densc villosa, tubo 1¼ lin. circiter longo ; baccæ......—*Pegu ; Martaban ; Tenasserim.*

89. Vangueria pubescens, nov. sp.

Arbuscula decidua, 20—25 pedalis, pubescens, spinis oppositis rectis armata; stipulæ subulatæ, pubescentes; folia ovata ad elliptico-lanceolata, basi acuta v. cuneata, petiolo 2—3 lin. longo pubescente, breviter acuminata v. acuta, 2—3 poll. longa, integra, membranacea, supera breve et scabrido-subtus molli-pubescentia; flores parvi, viridiusculi, pedicellis 2—3 lin. longis pubescentibus, in cymulas v. fasciculos e ramulis reductis verruciformibus v. ex foliorum axillis ortos dispositi; calyx pubescens, lobis linearibus; corolla pubescens; stigma capitatum; baccæ cerasi minoris magnitudine, $\frac{1}{3}$—$\frac{1}{2}$ poll. crassæ, læves, lutescentes, pyrenas 5—4 osseas monospermas continentes.—*Burma.*

90. Canthium gracilipes, nov. sp.

Frutex inermis, ramulis parce pubescentibus; stipulæ ovatæ, subulato-acuminatæ, adpresse fulvo-pubescentes; folia ovato-oblonga ad oblongo-lanceolata, basi acuta v. obtusa, petiolo tenui 1—2 lin. longe pubescente suffulta, 2—4 poll. longa, integra, acuminata, membranacea, nervis fulvo et tenui pubescentibus exceptis glabra; flores parvi, pedicellis $\frac{1}{2}$—$\frac{3}{4}$ poll. longis capillaribus sparse adpresse pubescentibus instructi, solitarii v. gemini, e ramulis abbreviatis lateralibus orientes; calyx glaber, hemisphæricus, $\frac{1}{2}$ lin. longus, dentibus 3-angularibus; corolla... ; drupæ didymo-reniformes, apice sinuatæ, compressiusculæ, læves, pyrenas 2, (v. abortu 1) obsolete rugoso-tuberculatas dorso rotundatas includentes.—*Andamans.*

91. Gynochthodes macrophylla, nov. sp.

Frutex scandens, glaber, partibus omnibus in sicco nigrescentibus; stipulæ geminatæ et breves, truncatæ; folia elliptica ad elliptico-oblonga, basi acuta, petiolo semipollicari sustenta, magis minusve obtusiuscule apiculata, 3—5 poll. longa, integra, pergamacea, glabra, subtus in axillis nervorum fimbriato-glandulosa; flores parvi, pedicello crasso 2—3 lin. longo sustenti, 4—5-ni in pedunculo verruciformi breve bracteato fasciculati; calyx lineam circiter longus, glaber, tubo subgloboso, limbus truncatus, cyathiformis, tubi longitudinis; corolla &c. ignota.—*Andamans.*

92. Psychotria Helferiana, nov. sp.

Frutex fulvo- v. brunneo-hirsutus; stipulæ lanceolatæ, acuminatæ, fere ad basin bifidæ, dense adpresse ferrugineo-hirsutæ; folia lanceolata, utrinque acuminata, petiolo adpresse brunneo-hirsuto $\frac{1}{2}$—1 pollicari sustenta, 3—4$\frac{1}{2}$ poll. longa, integra, membranacea, utrinque breve-hirsuta; flores minuti, virescenti albidi, sessiles, in capitulas densas breve pedunculatas congregati et cymam compactiusculam v. laxam trichotomam ferrugineo-hirsutam terminalem (et axillarem ?) formantes; calyx brunneo-hirsutus, lineam circiter longus, dentibus lanceolatis; corolla glabra, fauce barbata, tubus lineam fere longus, lobi tubi longitudinis; baccæ ovales, calycis limbo hirsuto coronatæ

pisi magnitudine, sparse hirsutæ, aurantiacæ ; pyrenæ carinato-triangulares ; albumen æquum.—*Tenasserim* or *Andamans.* (?)

93. Psychotria monticola, nov. sp.

Frutex humilis 1—3 pedalis glaber ; stipulæ bifidæ, lanceolatæ v. a basi lata acuminatæ, deciduæ ; folia lanceolata ad oblongo-lanceolata, utrinque acuminata, petiolo ½—1 pollicari, 4—6 poll. longa, integra, crasse membranacea, glabra, paullulo glaucescentia ; flores parvi, albi, sessiles, in capitula 3 brevè pedunculata v. subsessilia bracteata denso congregati et cymam depauperatam pedunculo crasso sæpius villosulo ½—1½ pollicari suffultam terminalem v. e ramulorum furcationibus orientem formantes ; calyx lineam circiter longus, glaber v. obsolete pubescenti-ciliatus, 5-fidus, lobis lanceolatis subulato-acuminatis ; corolla glabra, fauce villosa, tubus lineam circiter longus, lobi tubi longitudinis ; baccæ oblongæ, pisi magnitudine, rubræ, lucidæ, calycis limbo coronatæ ; pyrenæ longitudinaliter sulcatæ et costatæ (costis 3—4) ; albumen spurie ruminatum.—*Martaban, Tenasserim.*

94. Psychotria viridissima, nov. sp.

Fruticulus 1½—2 pedalis glaberrimus ; stipulæ verosimiliter lato- et breve triangulares, valde deciduæ ; folia ovato-oblonga ad elliptico-lanceolata, basi cuneatâ in petiolum subgracilem ½—1½ poll. longum decurrentia, magis minusve acuminata, 4—7 poll. longa, integra, tenere membanacea et flaccida, glabra, viridia ; flores parvi, albidi, pedicello crasso c. lin. longo suffulti cymam corymbiformem trichotomam breve (⅓—1 poll.) pedunculatam glaberrimam terminalem formantes ; calyx glaber, brevissimus, obsolete dentatus ; corolla fauce barbata, tubo amplo infundibuliformi lin. longo v. paullo longiore, lobis paullo brevioribus ; baccæ....—*Martaban, Tenasserim.*

95. Psychotria calocarpa, nov. sp.

Suffrutex 1—1½ pedalis subherbaceus, rhizomate repente, ramulis junioribus magis minusve crispulo-puberulis ; stipulæ bifidæ, e basi latiori subulato-acuminatæ et sæpius apicibus brunnescenti-pubescentes ; folia oblonga et ovata ad ovato-oblonga, basi acuta, petiolo crasso crispo-tomentosulo suffulta, acuta ad acuminata, 3—7 poll. longa, integra, pergamacea, glabra v. vulgo subtus secus nervos indistincte puberula ; flores parvi, albi, pedicellis brevissimis crassis, cymam breve (-⅓ poll.) pedunculatam contractiusculam erectam v. nonnunquam nutantem tomentellam terminalem v. spurie axillarem efformantes ; calyx lineam fere longus, 4-fidus, lobis lanceolatis obtusis viridibus ; corolla intus albo-villosa, tubus calycis segmentorum longitudine, limbi lobi breves, oblongi, obtusiusculi ; baccæ calycis lobis conspicuis coronatæ, ellipticæ, pisi magnitudine, lucidæ, coccineæ ; semina membrana alba tenui tantum induta, planó-convexa, lævia ; albumen æquum. —*Pegu, Martaban, Tenasserim.*

96. Ixora (Pavetta) compactiflora, nov. sp.

Frutex ? glaber ; stipulæ breve ovatæ, acutæ ; folia elliptica ad lato-

lanceolata, basi cuneata in petiolum ¼—½ pollicarem crassum attenuata, longiuscule acuminata, 3—5 poll. longa, integra, subpergamacea, glaberrima, in sicco nigrescentia ; flores parvi, sessiles v. subsessiles, capitulum densum circiter pollicem crassum involucratam terminalem v. spurie lateralem formantes ; involucri bracteæ parvæ et inconspicuæ, lato-ovatæ, imbricatæ ; calyx lineam circiter longus, glaber, dentibus oblongis obtusis semilinealibus; corolla glabra, tubo 3 lin. tantum longo, ampliuscula, lobi oblongi, obtusi, tubi longitudinis ; baccæ.—*Tenasserim.*

97. Ixora (Pentadium) Helferi, nov. sp.

Frutex ? glaber ; stipulæ lato-ovatæ, acuminatæ, glabræ ; folia oblongo-lanceolata, utrinque acuminata, petiolo 3—4 lin. longo, integra, 5—8 poll. longa, tenui membranacea, in sicco nigrescentia ; flores majusculi, pedicello crasso puberulo usque ad lineam longo sustenti, cymulosi et paniculam thyrsoideam brachiatam longe pedunculatam sparse puberulam efformantes ; bracteolæ lineari-subulatæ unacum bracteis glabræ ; calyx 1½ lin. fere longus, minute puberulus, dentibus 5 lanceolatis acutis calycis tubi longitudine ; corolla (in alabastro) extus minute fulvo-pubescens, lobi duplo breviores ; baccæ....—*Tenasserim.*

98. Ixora sessiliflora, nov. sp.

Frutex magnus ramosus glaberrimus ; stipulæ e basi latâ rotundatâ abrupte acuminatæ ; folia oblonga ad oblongo-lanceolata, basi rotundata, petiolo crasso 2—3 lin. longo suffulta, breve acuminata, 3—4 poll. longa, integra, tenui coriacea, glabra ; flores (inprimis tubus) pallide rosei, parviusculi, sessiles, corymbum parviusculum trichotomum glabrum efficientes ; pedunculus semipollicaris ; calyx ½ lin. longus, glaber, dentibus brevissimis ; corolla glabra, tubo gracili fere ¾ pollicari, lobi ovato-oblongi, acutiusculi ; stigma breviter exertum ; baccæ....—*Martaban.*

99. Ixora memecylifolia, nov. sp.

Frutex glaber ; stipulæ e basi latâ abrupte et longe subulatæ ; folia ovata v. ovato-oblonga, subsessilia, basi rotundata v. subcordata, 2½—4 poll. longa, acuminata, integra, tenui-coriacea, glabra, in sicco nigrescentia v. fuscescentia ; flores parvi, albi ? v. pallide rosei ?, sessiles, corymbum longius v. brevius pedunculatum trichotomum glabrum terminalem vulgo ad basin diminute bifoliolatum formantes ; bracteæ parvæ, lineares ; calyx glaber, lineam circiter longus, dentibus fere calycis tubi longitudine lanceolatis ; corolla glabra, tubo circ. 4 lin. longo, lobi dimidio fere breviores ; stylus longe exsertus, apice bilobus ; baccæ....—*Tenasserim.*

100. Ixora Brandisiana, nov. sp.

Frutex glaber ; stipulæ e basi latâ subulato-acuminatæ ; folia oblongo-ovata ad oblonga, petiolo brevissimo crasso suffulta v. subsessilia, basi rotundata, 4—6 poll. longa, acuminata, integra, tenui-coriacea, glabra, in sicco nigrescentia ; flores longissimi, albi ?, brevissime pedicellati, cymam par-

vam trichotomam minute puberulam brevissime pedunculatam terminalem formantes ; bracteæ parvæ, lanceolatæ, acuminatæ, superiores angustiores et minores ; calyx lineam longus, glaber, lobis lanceolatis acutis, calycis tubi longitudine ; corolla glabra, fauce villosa, tubo gracillimo 1½—2 pollicari, lobi lineari-oblongi, acuti, 3—3½ lin. longi ; stylus exsertus lobis stigmaticis brevissimis ; baccæ....—*Tenasserim.*

* 101. Ixora brunnescens, nov. sp.

Arbuscula 20—25 pedalis glabra ; stipulæ e basi lata abrupte subulato-acuminatæ ; folia magis minusve obovata, basi rotundata v. obtusa, crasse et brevissime (-1 lin.) petiolata v. subsessilia, 4—6 poll. longa, obtusa v. obtusiuscule apiculata, integra v. undulata, coriacea, glabra, nervis lateralibus approximatis et subparallelis ; flores...graciliter pedicellati, cymulosi, corymbum brachiatum trichotomum breve (1—1½ poll.) pedunculatum glabrum terminalem formantes ; calyx parvus, glaber, dentibus minutis triangulari-acutis ; corolla... ; baccæ globosæ, calycis limbo coronatæ, pisi minoris magnitudine, læves.—*Andamans.*

102. Ixora rosella, nov. sp.

Frutex glaber ; stipulæ ovatæ, acuminatæ ; folia oblongo-lanceolata ad elliptico-oblonga, basi acuminata, petiolo crasso ½—1 poll. longo suffulta, breve et subabrupte acuminata, 6—9 poll. longa, integra, coriacea, glabra, subtus pallida ; nervis lateralibus tenuibus, satis approximatis et leviter curvato-parallelis ; flores minores, pallide rosei, pedicellis 1—3 lin. longis suffulti, cymulosi, in corymbum subsessilem brachiato-trichotomum minute puberum terminalem dispositi ; calyx ½ lin. longus, minute puberus dentibus minutis lato-triangularibus acutis et obtusis ; corolla glabra, tubo pollicem circiter longa, lobi oblongi, obtusi, quadruplo breviores ; stylus breviter exsertus lobis stigmaticis crassis vix separatis ; baccæ globosæ, pisi minimi magnitudine, calycis limbo coronatæ, læves.—*Andamans.*

COMPOSITÆ.

103. Leucomeris decora, nov. sp.

Arbuscula 12—15-pedalis, decidua, novellis albido-villosis ; folia elliptico- ad oblongo-lanceolata, basi inæquali acuta, petiolo ½—1 poll. longo glabro suffulta, 5—7 poll. longa, membranacea, acuminata, glabra v. subglabra ; capitula brevi squamato-pedunculata in ramorum apicibus dense aggregata ; involucrum elongato-cyathiforme, in pedunculum imbricato-sqamatum, 3—4 lin. longum attenuatum ; squamæ lanceolatæ, deorsum sensim minores, rigidæ, tenui-arachnoideæ, virides ; flosculi fragrantes, albi, pollicem fere longi ; pappus pallide fulvescens, semipollicaris ; achenia semipollicaria, sulcata, dense adpresse villoso-sericea.—*Prome.*

104. Ainsliæa Brandisiana, nov. sp.

Herba perennis, erecta, 1—3-pedalis parce villosa ; folia rosulata, cordato-oblonga ad cordato-elliptica, petiolo ½—2 poll. longo, stupposo-villoso crasso suffulta, 2—4 poll. longa, acuta v. obtusiuscula, marginibus integris dense villosis, crasse membranacea, præsertim subtus plus minusve hirsuta, supra sæpius glabrescentia ; capitula in scapo radicali paniculata, pedunculis ½—1-pollicaribus glanduloso-puberis suffulta ; bracteæ minutæ, subulatæ, subrigidæ ; involucri squamæ lineari-lanceolatæ, acutæ, rigidæ, 4-lin. longæ, inferiores duplo v. triplo breviores, læves, virides, albido-marginatæ ; flosculi albi, ½ poll. fere longi ; achenia 2—3 lin. longa, adpresse pubescentia ; pappus flavidus, c. 4 lin. longus.—*Martaban.*

105. Tricholepis Karensium, nov. sp.

Herba annua, robusta, ramosa, 2—3 pedalis, parce pubescens ; folia caulina linearia ad lineari lanceolata, 2½—3 poll. longa, basi in petiolum brevissimum attenuata, acuminata v. acuta, remote setaceo-denticulata, membranacea, parce arachnoideo-pubescentia, supra glabrescentia ; capitula magna, 2 poll. fere in diametro, terminalia, solitaria, sessilia ; involucri squamæ numerosissimæ, densissimæ imbricatæ, subulatæ, 1—1½ poll. longæ, albido-pilosæ ; flosculi purpurei ? achenia 3—4 lin. longa, lævia ; pappus inæqualis achenio duplo circiter longior, flavescens, pilosus.—*Martaban.*

Monograph of Indian Cyprinidæ, (Part VI),—*by Surgeon Major* Francis Day.

Since the commencement of this Memoir on the carps of India, in the Journal of the Asiatic Society of Bengal, (vol. XL, Pt. II, 1871) several new or little known species have been personally collected, or received through the kindness of friends. All of these require to be fully described, (except *Labeo boggut*, Sykes, and *Cirrhina dero*, Ham. Buch., see ante J. A. S. B. 1872, pp. 259 and 960) ; likewise a few corrections have to be noted.

Discognathus lamta.

In Journ. A. S. B. for 1871, Pt. II, p. 110, for D. $\frac{3}{8}$, V. 10, *read* D. $\frac{3-2}{8-9}$, V. 9, Vert. 18/14.

A very interesting variety of this species has been kindly collected for me by Dr. Waagen from the Nilwan ravine near the Shapur salt ranges. The depression across the snout is very deep, and the dorsal fin is concave along its upper margin and higher than the body.

Genus. Oreinus.

Capöeta micracanthus, Günther, Catal. vii, p. 81.

Four specimens of this fish "stuffed from 18 to 23 inches long. Punaka. From the collection of the East India Company," exist in the British Museum, and are now correctly labelled *Oreinus*, to which genus they belong.

Labeo ricnorhynchus.

l. c. p. 123, erase "? *Cyprinus musiha*, H. B. pp. 333, 392."

Labeo nukta.

Cyprinus nukta, Sykes, Trans. Z. S. ii, p. 325.
„ *auratus*, Sykes, l. c
Carassius auratus, Günther, Catal. vii, p. 32 (not syn.).

B. III, D. 2/9, P. 15, V. 9, A. 2/5, C. 19, L. l. 38, L. tr. 8/9.

Length of head nearly 1/5, of caudal 2/9, height of body 2/7 of the total length. *Eyes*, diameter 1/6 of length of head, 2½ diameters from the end of the snout, and slightly nearer the posterior margin of the opercle than to the end of the snout. *Head* compressed, snout projecting over the mouth and having a deep groove passing from one orbit to the opposite one, thus occasioning the appearance as if there were a blunt compressed knob, between and before the orbits. Mouth transverse. The lips with a distinct inner hold at the angle of the mouth and extending across the outer third of the lower jaw, from which the tip is reflected and rough, but neither are fringed. Some large pores on the snout, forehead and in the rostral groove. *Barbels*, a fine maxillary pair. *Fins*, dorsal without any osseus ray, arising midway between the snout and the posterior extremity of the base of the anal fin, its anterior three rays are much elevated and higher than the body, the last besides being divided to its root, being also somewhat prolonged, so the upper margin of the fin is concave. Ventrals arise under the middle of the dorsal and scarcely reach the anal. Pectoral as long as the head. Caudal deeply forked. *Lateral line* complete to the centre of the base of the caudal, but very badly marked, 4½ rows of scales between it and the base of the ventral fin. *Colours* silvery with some red marks on some of the scales.

Hab.—Dakhin (Deccan); through the assistance of Colonel Evezard, I obtained two specimens from Púna, 10 and 12 inches respectively in length.

Genus. Cirrhina.

Cirrhina sindensis.

B. III, D. 3/10, P. 15, V. 8, A. 2/5, C. 19. L. l. 43, L. tr. 8/8.

Length of head, of caudal fin, and height of body each 1/5 of the total length. *Eyes*, situated in the middle of the length of the head, 2 diameters

from the end of the snout. Interorbital space nearly flat. Snout rounded, covered with glands and having a deep groove extending across it from eye to eye. Mouth transverse, inferior. Mandibles sharp not enveloped in lip, and having a thin horny covering. Lips entire. *Barbels*, a pair of very short maxillary. *Fins*, dorsal commences midway between the end of the snout, and the posterior extremity of the base of the anal, its third undivided ray weak, fin rather higher than the body. Pectoral as long as the head without the snout, not reaching the ventrals, which last arise under the middle of the dorsal. *Lateral line* nearly straight, $6\frac{1}{2}$ rows of scales between it and the base of the ventral fin. *Colours* silvery with a reddish tinge, the bases of the scales the darkest, fins red.

Hab.—Sind Hills, attaining 8 inches in length.

Although this fish is evidently a *Cirrhina*, as seen by the position of its ventral fins, still the horny covering to its lower jaw is remarkable.

CIRRHINA BATA, H. B.

Day, J. A. S. of Beng, 1871, p. 140.

Cyprinus bata, H. Buch., is said to be "found in the rivers and ponds of Bengal" (H. B.), its native name is given as *bata*. From the same localities and called by the same name '*bata*' I obtained numerous specimens of a fish agreeing in *nearly* every respect with H. B.'s description and a figure which still exists amongst his MS. drawings; the *only exception being* that the drawing gives 12 dorsal rays instead of 11, whilst the text states "the last of them being divided to the root," which division to the root is not shown in the last ray in the original drawing. To me (but I do not assert that I cannot be mistaken) it appears that the artist has separated the bases of the last two rays which should be shown as arising from one common root. Were this so in the drawing, the figure and the description would agree with my specimens (see Proc. Zool. Soc. 1871, p. 636).

Whilst seeing no reason for changing my views, I think it but fair to give Dr. Günther's opinion that "Hamilton Buchanan's fish has more than nine branched rays, (Zool. Record, 1870, p. 135). "The words of Hamilton Buchanan that this fish has "twelve rays in the fin of the back"......"the first" and "second" being "undivided, the others are branched, the last of them being divided to the root" have always conveyed to my mind the idea that this fish was described as clearly as possible as a fish with 10 branched dorsal rays." * * "Finally to set the matter beyond further dispute also with regard to the *C. bata*, I give (p. 765) an exact tracing of Hamilton Buchanan's MS. drawing of this fish, in which the ten separate branched dorsal rays are as clearly shown as could well be done." (Proc. Zool. Soc. 1871, p. 764).

It may perhaps be regretted that an addition has been made to the original figure, by numbers 1—10 having been added above the branched rays. Number 10, it will be perceived in the drawing, is not divided to the root, consequently if 9 and 10 sprang from one common root, the fish would agree with the species I have described in its native name, its description, its figure and the locality it inhabits; whereas such a fish with 10 branched rays, the last divided to its root, has not been collected, so far as I am aware. Still as the species is very largely domesticated, such a variety doubtless might easily occur.

Finally I may observe that, although Dr. Günther appears so decidedly of opinion that my fish with 11 dorsal rays cannot be H. B.'s *C. bata*, the following occurs in the Catalogue of Fishes of the British Museum, vii, p. 35. "5. Cyprinus bata, *Ham. Buch.*, p. 283; ? = Cyprinus acra, *Ham. Buch.*, p. 284; = Cyprinus cura, *Ham. Buch.*, p. 284." In Hamilton Buchanan's work he gives the number of rays of the dorsal fins of these species thus. *C. bata*, D. 12, *C. acra*, D. 11, *C. cura*, D. 12, and the species *C. acra*, with D. 11, and *C. cura*, with D. 12, are set down as identical even by Dr. Günther, whilst Hamilton Buchanan observes that the *C. acra*, "has the utmost resemblance to the *Bata*," and the *C. cura* is another fish nearly allied to the *Bata*. McClelland, Ind. Cyp. J. A. S. of B. 1839, p. 356, observes "*Cyprinus acra*, Buch., is also said to have the upper lobe of the caudal longer than the lower, but it has only eleven rays in the fin of the back; now whether a species can be said to have eleven or twelve rays in the dorsal depends entirely on the degree to which the last ray is separated or divided, which in this group it always is, more or less; there can, therefore, be little doubt the *Cyprinus bata* and *Cyprinus acra* are the same species." Thus agreeing with McClelland who considered these fish identical, and Dr. Günther who supposed them to be so, I have taken Buchanan's first specific name *bata* instead of his second *acra*, and which I see no reason for altering.

CIRRHINA FULUNGEE.

Chondrostoma fulungee, ? Sykes, T. Z. S. ii, p. 358.
Gymnostomus fulungee, *Günther, Catal. vii, p. 76.

B. III, D. 2/8, P. 15, V. 9, A. 2/5, C. 19, L. l. 44, L. tr. 8/9.

Length of head 1/6, of caudal 1/5, height of body 1/5 of the total length. *Eyes*, diameter 1/4 of length of head, 1 diameter from end of snout. Dorsal and abdominal profiles equally convex. Snout overhangs the mouth, a few pores upon it. Lips smooth. *Barbels*, a pair of short rostral, but no maxillary ones. *Scales*, 6½ rows between the lateral line and the base of the ventral fin. *Colours* silvery, edges of scales darkest; fins stained.

Hab.—Púna, growing to 6 inches in length.

Whether this is Sykes' species is of course doubtful, as he has not (so far as I know) left any figure of it, but the resemblance, considering these specimens came from the Dakhin (Deccan), is sufficiently strong to avoid giving another name. Sykes states A. 6, but I conclude he may have counted the two first undivided ones as one.

*CIRRHINA ROSTRATA.

Crossochilus rostratus, Günther, Catal. vii, p. 72, and Zool. Record, 1870, p. 135.

B. III, D. 11, A. 7, L. l. 38, L. tr. 5½/7.

The height of the body is somewhat more than the length of the head, which is one-fifth of the total without the caudal. *Eyes*, diameter 2/7 of length of head, and situated somewhat behind its middle. Snout conical, long, and much protruding beyond the mouth. *Barbels* two, rostral, shorter than the eye. *Fins*, origin of dorsal considerably in advance of that of the ventral, and midway between the end of the snout and the posterior end of the anal fin; pectoral a little longer than the head, terminating at a great distance from the ventrals. *Scales*, 4 rows between lateral line and ventral fin. *Colours*, a black spot (composed of about four smaller spots) on the fifth and sixth scales of the lateral line.

Hab.—Cossye river, from which a single specimen 4 inches long has been obtained.

Dr. Günther (Proc. Zool. Soc. 1871, p. 762) appears surprised at my not having perceived the difference between this species and *C. bata* from his first description (Catal. vii, p. 72); his definition there of genus *Crossochilus*, p. 71, gives "Barbels two or four: if two, the upper only are present." *C. bata* having only two and those the lower or maxillary ones, seemed to show that some inaccuracy existed in the definition of the genus; whilst in the text of *C. rostratus* all that is said about these appendages, is—"Two barbels only, shorter than the eye," without stating whether they are rostral or maxillary, otherwise the description agreed pretty fairly with *C. bata* which came from the same locality. Subsequently in the Zool. Record. l. c. he states that *C. rostratus* "has a pair of upper barbels only, but no maxillary barbels," thus clearing up this point. I have stated this much because Dr. Günther in the Pro. Zool. Soc. 1871, p. 762 asks: "Will Mr. Day point out where I have given this second description, or whether I have added one iota to my original description in 1868?"* This date I conclude

* As some time must elapse before my *Siluroids* find a place in the Journal, I proprose offering a few remarks upon *Pseudeutropius taakree*, Sykes. Dr. Günther in the Proc. Zool. Soc. 1871 in remarking on my having been mistaken in considering the skin of this fish, received from the Zool. Soc. as being one of Col. Sykes' types of his paper, states, the registry does not give his name as a donor once, and of the East Indian Museum " although I searched carefully that Museum (before and after the

is only another inaccuracy, as Vol. vii of the Catalogue is dated November 1st, 1867, and contains the description I have adverted to.

Genus. SCAPHIODON, Heckel.

Capoëta, sp. *Chondrostoma*, sp. Cuv. and Val.
Dillonia and *Gymnostomus*, sp. Heckel.

Abdomen rounded, snout rounded; mouth transverse, inferior, having the mandibular edge nearly straight and sharp, the mandibles angularly bent inwards. A horny layer inside the lower jaw, which last is not covered by lip. No lower labial fold. Barbels four, two, or absent. Pharyngeal teeth compressed, truncated, 5 or 4, 3, 2/2, 3, 4 or 5. Dorsal fin of moderate extent (up to about ten branched rays), its last undivided ray being osseous and serrated, or else articulated; anal rather short. Scales large, of moderate or small

transfer of its fish collection to the British Museum) for types of Colonel Sykes's paper I failed to discover them."

In the Catalogue of the fishes of the British Museum, by Dr. Günther, Vol. v, p. 46, is "*a. b.* eight and a half to nine and a half inches long. Dukhun. From Colonel Sykes's collection, types of *Schilbe pabo*, Sykes." At p 76, under *Macrones cavasius* is a specimen "from the collection of Colonel Sykes" about the same size as his published figure. At page 187 under *Glyptosternum lonah* is "*a.* Type of the species from the collection of Col. Sykes." Thus in the Catalogue of the fishes of the British Museum the possession of some of Sykes' types is asserted, but where they came from I believe is not known; Col. Sykes's name is not referred to, that I see, when the collections in E. I. Co. Museum are mentioned, though Cantor's, Griffith's and McClelland's are. Still it seems that I was mistaken in considering this skin as one from the collection of the Zoological Society, whose donor's name was omitted from the Catalogue, and which had on it a label with one of Col. Sykes's names, as being one of his types.

Respecting my being assisted, as Dr. Günther more than insinuates, in determining the species by his having erroneously (as he believes) written *P. taakree* on the bottle, a slight reference to dates again disposes of this. My first inspection of this skin was in 1870, whilst in the Proc. Zool. Soc. 1869, p. 617, I observed when writing from Burma—"The *Pseudeutropius taakree*, Sykes, or *P. longimanus*, Günther, is tolerably abundant in the Irrawadi and its branches." Since then I have received it from Púna in the Dakhin (Deccan).

Lastly Dr. Günther states the skin which is 6 inches long (Sykes's figure is 5 $\frac{1}{10}$) "had been presented with others to the Society by Mr. Willie in 1834,—that is five (four ?) years before Col. Sykes communicated his paper to the Zoological Society." To complete this observation, I may continue that Col. Sykes left India in 1831, and though the "fishes of the Dekhun" were published in 1841, he expressly observes in a note, that "although the preceding details respecting the fishes of the Dekhun were comprised in a report to the Court of Directors of the East India Company in June, 1831, they were only communicated to the Zoological Society on the 27th November, 1838." Thus the Zoological Society obtained the specimen (*Pimelodus vacha* as registered, not very closely resembling a *Pseudeutropius*) three years after Col. Sykes returned to Europe and subsequent to the time when his manuscript had been completed and given to the E. I. Company.

size and sometimes irregularly disposed. Lateral line passing to the centre of the base of the caudal fin.

Geographical distribution. Rivers of Western Asia extending eastwards to those in the Sind hills.

SYNOPSIS OF SPECIES.

A. *Barbels two*

1. *Scaphiodon Watsoni,* D. 3/10, A. 2/7, L. l. 33. An osseous serrated dorsal ray. Scales regularly arranged. *Sind hills.*

2. „ *irregularis,* D. 3/10, A. 2/7, L. l. 36. An osseous, serrated, dorsal ray. Scales irregularly arranged. *Sind hills.*

1. SCAPHIODON WATSONI.

B. III, D. 3/10, P. 15, V. 8, A. 2/7, C. 19, L. l. 33, L. tr. 6/6.

Length of head 1/5, of caudal 1/5, height of body 2/9 of the total length. *Eyes* situated in the commencement of the anterior half of the head, diameter 2/9 of length of head, 1½ diameters from the end of the snout. Interorbital space somewhat convex. Snout rounded and covered with glands; mouth transverse, inferior, mandibles sharp not enveloped in lip, and having a horny layer inside. A pair of maxillary barbels as long as the eye. *Fins,* dorsal commences rather in front of the ventrals, and midway between the end of the snout and the base of the caudal, its last undivided ray strong, osseous, serrated, as long as the head without the snout, and nearly as long as the branched rays, which are two thirds as high as the body Pectoral as long as the portion of the head posterior to the angle of the mouth, but not reaching the ventrals. Caudal forked. *Lateral line,* very slightly curved, 3½ rows of scales between it and the ventral fin. *Colours* silvery, dashed with gold, lightest on the abdomen. Various and very irregular black spots on the body.

Hab.—Sind hills. I have much pleasure in naming this species after H. E. Watson, Esq., who largely assisted me in making collections of specimens of natural history whilst in Sind.

2. SCAPHIODON IRREGULARIS.

B. III, D. 3/10, P. 17, V. 8, A. 2/7, C. 19, L. l. 36, L. tr. 9/9.

Length of head, caudal fin and height of body, each 1/5 of the total length. *Eyes,* situated in the commencement of the anterior half of the head, 1½ diameters from end of the snout and apart. Interorbital space nearly flat, snout somewhat rounded, covered with glands and having a depression across it from eye to eye. *Fins,* dorsal commences rather before the ventrals midway between the end of the snout and the base of the caudal fin, its third undivided ray is osseous, weak, and serrated, nearly half as long as the head, whilst the fin is three fourths as high as the body. Pectoral nearly as long as the head; caudal forked, its lower lobe the longer.

Scales, two or three rows above the lateral line are of a large oblong form, above these are numerous small irregular ones, whilst the scales on the chest are likewise very small; four and a half rows exist between the lateral line and the base of the ventral. *Colours* olive, shot with gold.

Hab.—Rivers in the Sind hills up to 3500 feet elevation. I have also received from Dr. W. Waagen,* four specimens of a species of this genus obtained from Marrí, and which are scarcely separable from the foregoing; they have L. l. 38, L. tr. 7½/9, whilst the rows of scales above the lateral line are not so distinctly irregular. The largest of these specimens is 6 inches in length.

Barbus (Barbodes) Himalayanus.

Chit-rah-too, Panj.

B. III, D. 3/8, P. 15, V. 9, A. 2/5, C. 17, L. l. 32-34, L. tr. 5½/6.

Length of head nearly 1/4 (4/13), of caudal 1/6, height of body 1/4 of the total length. *Eyes*, diameter 2/11 of length of head, 2¼ diameters from end of snout, and 2 diameters apart. Dorsal and abdominal profiles equally convex. *Head*, much compressed, a depression across the snout just anterior to the orbits, lower lip lobed as in *B. tor;* upper jaw the longer without thickened lips. *Barbels*, the rostral pair of the same length as the maxillary, and they equal 1⅓ diameters of the orbit. *Fins*, dorsal commences midway between the nostrils or the anterior margin of the orbit and the base of the caudal fin, its spine is moderately stout, entire, and equals the length of the head without the snout, upper margin of fin concave; pectoral as long as the head without the snout, it does not reach the ventral, which is slightly shorter and does not extend so far as the base of the anal, which last reaches the root of the caudal when laid flat; caudal forked, lobes of equal length. *Scales*, 3½ rows between the lateral line and the base of the ventral fin. *Colours* golden above, becoming silvery below; the margins of the scales with numerous fine black dots, in the young a black mark behind the gill openings; fins reddish.

Hab.—Ussun river, about four miles from Simla. Out of five specimens the longest was 7 inches in length.

Barbus (Puntius) Waageni.

B. III, D. $\frac{2-3}{8}$, P. 15, V. 9, A. 2/5, C. 17, L. l. 23-24, L. tr. 4/7.

Length of head 1/4, of caudal 2/9, height of body 1/3 of the total length. *Eyes*, in the anterior half of the head, 3/4 of a diameter from end

* Besides the fishes alluded to in this paper, the collection contained the following from Marrí in the Panjáb: *Macrones Lamarrii*, Val., *Labeo ricnorhynchus*, McClell., *Barbus tor*, H. B. Likewise *Barilius piscatorius*, McClell., from a fresh water stream near Wallus. Also one small specimen of *Cirrhina gohama*, H. B., and several of *Nemacheilus corica*, H. B.

of snout. Upper surface of the head flattened; mouth horse-shoe shaped, compressed, and anterior, lower jaw not covered by lip; the posterior extremity of the maxilla reaches half way to below the orbit. *Barbels* absent. *Fins*, upper margin of dorsal straight, the fin is half as high as the body and without any osseous ray, it commences midway between the posterior margin of the orbit, and the base of the caudal; pectoral as long as the head without the snout, not reaching the ventral, which arises under the anterior dorsal rays and does not extend to the anal; caudal forked. *Scales*, 4½ rows between the row which contains the lateral line and the base of the ventral fin. *Lateral line* ceases on the seventh scale. *Colours* silvery, darkest above; a black blotch on the 17th and 18th rows of scales, and posterior to the anal and dorsal fins.

Hab.—From Chua Saidar Shah, Salt Range; specimens up to 2¼ inches in length were collected by Dr. Waagen who kindly furnished me with them.

BARBUS (PUNTIUS) VITTATUS, Pt. II. p. 107.

From a recent examination of several fine specimens of this fish obtained by Dr. Stoliczka in Kachh I find its last undivided dorsal ray is articulated, not osseous; so it must be removed to the division of *Puntius*, being without osseous dorsal ray.

Genus. BARILIUS.

BARILIUS EVEZARDI.

B. III, D. 2/7, P. 13, V. 9, A. $\frac{2}{12-13}$, C. 17, L. l. 40, L. tr. 7/4.

Length of head 2/11, of caudal 2/11, height of body 1/5 of the total length. *Eyes*, diameter 1/3 of length of head, 3/4 of a diameter from the end of the snout and apart. *Barbels* absent. The maxilla extends to beneath the anterior margin of the orbit. Humeral process short, being scarcely produced. Third suborbital bone twice as deep as the uncovered portion of the cheek below it to above the angle of the preopercle. A well developed knob at the symphysis of the lower jaw. *Fins*, pectoral as long as the head, the dorsal commences midway between the hind edge of the orbit and the end of the caudal fin, whilst its posterior half is above the anal. Lower caudal lobe the longer. *Colours* silvery; dorsal, caudal and anal deep orange, the first two having a black edge.

Hab.—Púna; growing to 4½ inches in length. Out of the specimens collected through the assistance of Colonel Evezard were two of this species, and subsequently I have received one obtained in the same locality by Dr. Stoliczka.

NEMACHEILUS MONTANUS, Pt. V. p. 192.

Having been able to collect near Simla numerous specimens of this fish, from whence McClelland obtained his types, I find that considerable variations occur in the species.

The first, apparently typical form, has D. $\frac{2-3}{7}$. Head nearly 2/3 as wide as long; preorbital terminating posteriorly in an obtuse projection. Scales very minute, but most distinct in the posterior part of the body. In some the dark bands on the body are as wide as, in a few narrower or wider than, the ground colour. The dorsal has one row of spots, which are present or absent on the caudal.

The second variety has D. $\frac{2}{7-8}$. Head at least 2/3 as wide as long, no projection to preorbital. Colours the same.

The third form has D. $\frac{2}{7-8}$. Head almost as wide as long, depressed, muzzle rounded; no preorbital prominence, the pectoral a little longer than in the two previous forms. Colours the same except that some have several rows of black spots both on the dorsal and caudal fins, others have only a single row.

ON TWO UNDESCRIBED CASHMIR BIRDS,—*by* W. E. BROOKS, C. E. *Assensole.*

[Received 16th October, read 4th December, 1872.]

ACCENTOR JERDONI, sp. nov.

Bill shorter, feebler and sharper pointed than in *A strophiatus*, and not nearly so black. One specimen has the basal portion of the lower mandible pale brown. Total length 4·5 inches; wing 2·54 to 2·62; tail 2·3 to 2·54; bill at front ·35; tarsus ·75.

This bird in mode of coloration strongly resembles *A. strophiatus*, yet it is very distinct; being altogether a paler, and less boldly marked species. The striation of the back is comparatively cloudy, and resembles that of *Pipastes arboreus.* The upper surface is a mixture of brownish grey and dark brown, and there is none of the warm rufous tint observable on the back of *A. strophiatus.* The rump and upper tail coverts, which are strongly streaked in *strophiatus*, are plain greyish brown in our bird, with hardly the faintest streak perceptible. The anterior portion of the supercilium is whitish, as in *strophiatus*, but the remainder, instead of being deep rusty red, is merely warm buff or fulvous. Above the supercilium is a dark band on each side of the head, which is continued to the occiput. The crown of the head is brownish grey, mottled indistinctly with pale brown. The back is brown-

ish grey, streaked with dark brown. Ear coverts dark slatey brown, slightly mottled with greyish white. A patch of pure grey, very faintly streaked with brown, between the ear coverts and bend of wing. From chin to upper breast white, with small neat dark brown spots; below this white, a broad (3/4 inch) pectoral band of rufous, not nearly so deep and bright as in *strophiatus* and devoid of dark streaks; *strophiatus* sometimes has the pectoral rufous strongly streaked. Rest of lower surface dull whitish with the flanks tinged with brown, the latter having also broad cloudy brown streaks. Lower tail coverts pale brownish, with broad whitish edges; wings and tail brown, of a much lighter shade than in *strophiatus*, and having pale brown margins to the feathers, particularly so in the case of the wing coverts and tertials.

I have thought necessary to refer comparatively to *A. strophiatus* in this description, on account of the similar distribution of colours, and size of the two birds. They can only be understood by contrasting them. I have one specimen of the new bird from Dhurmsala, and others from Cashmir. *A. strophiatus* ranges from near Simla to Darjiling; but at what point west of Simla is its *western* limit, and where the *eastern* one of *A. Jerdoni* begins, is not yet known. Captain Cock took some nests of the new bird with eggs (uniform greenish blue) at Sonamurg, up the Seind valley in Cashmir.

The other bird which I have to describe is

Troglodytes neglectus, sp. nov.

It is of the same size as *T. Nipalensis*, but very much lighter in colour and having a strong resemblance to the English wren. It is dull reddish brown above, becoming brighter in tone towards and on the tail. The whole of the upper surface is covered with wavey dark brown bars, which are very indistinct on the head, but increase in distinctness as the tail is reached, upon which they are very well marked. Below pale brownish, with the abdomen and belly nearly white, the whole of the under surface, like the upper, being barred with brown. Lower tail coverts brown, spotted with white. Bill brown, paler on lower mandible at base; legs and feet brown. Length 3·5 in.; wing 1·8; tail 1·2; bill at front ·42; tarsus ·63, central toe and claw ·57; hind toe and claw ·53. The sexes are alike in size and plumage.

Apart from its comparatively pale tone of colouration its much smaller and slenderer tarsus and foot easily distinguish it from *T. Nipalensis*, which is a very dark brown sooty looking little bird. Of *T. Nipalensis* the central toe and claw measure ·7; hind toe and claw ·62.

The Cashmir wren is not uncommon in the pine woods of Cashmir, and in habits and manners it strongly resembles its European congener. Its song is very similar, and quite as pretty. It is a shy active little bird, and

very difficult to shoot. I found two nests. One was placed in the roots of a large upturned pine, and was globular with entrance at the side. It was profusely lined with feathers and composed of moss and fibres. The eggs were white, sparingly and minutely spotted with red; rather oval in shape, measuring ·66 by ·5. A second nest was placed in the thick foliage of a moss grown fir tree, and was about 7 feet above the ground. It was similarly composed to the other nest, but the eggs were rounder, and plain white, without any spots.

NOTES ON BARMESE AND ARAKANESE LAND SHELLS, WITH DESCRIPTIONS OF A FEW SPECIES,—*by* W. THEOBALD, ESQ., *and* DR. F. STOLICZKA.

(Received and read 7th August, 1872.)

(With plate XI.)

The accompanying notes were suggested by the recent discovery of several new species of landshells, chiefly in the Arakan hills and in the neighbourhood of Moulmain. In addition to these a few species were found which proved to be identical with those formerly described from Sikkim, the Khasi hills, and Upper Pegu; the slight variations and the geographical distribution of these species will be noticed in connection with the descriptions of the new species.

CYCLOSTOMACEA.

RAPHAULUS PACHYSIPHON, n. sp. Pl. XI. Fig. 1.

R. testa cylindraceo ovata, anguste perforata, solida, fusca; spira obtusa, apice ad latus inclinato, excentrico; anfractibus 5½ *convexiusculis, transversim confertissime striolatis, ad suturam simplicem adpressis; anfractu penultimo sensim, ultimo valde, descendente, primo supra aperturam deplanato, altero ad suturam paulo constricto, ad basin convexiusculo; apertura fere verticali, circulari, peristomate pallide fucescente, plane expanso atque crasso, supra ad anfractum penultimum labio attenuato et fere horizonli adnato, postice (aut supra) ad suturan tubulo crasso, deflexo instructo. Long.* 12·6, *lat. anf. penult.* 7·6, *diam. apert. cum perist.* 6·2, *apert. int.* 3·6 *m.m.*

Hab. Prope Moulmain, valle Ataran fluminis.

A rare and very distinct from any of the other known species by its distorted spire and externally bent down sutural tube. The figures 1 and 1*a* are of the natural size, 1*b* and 1*c* are the corresponding figures, enlarged twice the natural size.

Genus, ALYCÆUS.

Of this genus several species were found which were previously only known to occur in Sikkim, and in the Khasi and Garo hills. *A. pusillus* was met with at Nattoung in the Mendon district, Pegu; *A. urnula*, and a small variety of *A. Ingrami*, at Mai-i in the Arakan hills; *A. crispatus* at Maianoung and near Moulmain; at this last named locality also occurred a large, red-liped variety of *A. urnula*, and several specimens of *A. Richthofeni*, the shells slightly vary in the height of the spire, but all are of exactly the same character.

ALYCÆUS KURZIANUS, n. sp. Pl. xi. Fig. 2.

A. testa subglobose conoidea, late umbilicata, pallide rubescente; anfractibus 4, *valde convexis, sublævigatis, transversim distanter obsolete costellatis, ultimo anfractu medio ambitus modice inflato, confertim costulato, tum valde constricto lævigatoque, in constrictione costâ obtusâ transversâ instructo, rursusque expansiusculo atque paulo deflexo; apertura magna, obliqua, subrotundata, supra obtuse angulata, infra anguste canaliculata; preritremate modice incrassato, duplici, externo paulum expanso, labro interno plicatulo, labio sublævigato. Diam. maj. specim. maximi* 3·5, *minor* 3, *alt.* 2·7 *m.m.*

Hab. Nattoung in provincia Barmana, Prome dicta.

The peculiarly formed aperture with the lower canal and its internal plication on the outer lip readily distinguish this species from *A. polygona*, which besides differs by more rounded and higher whorls. Mr. Kurz brought some years ago a specimen of this interesting species from Pegu; more recently Mr. Theobald collected it near Nattoung in the Western Prome district. The measurements above given are those of one of the largest specimens.

Genus, DIPLOMMATINA.

Several remarkable varieties of formerly described species occurred with other known forms, both in Arakan and at Moulmain. Among these the following deserve special notice.

1. *D. sperata*, Blf., was found at Mai-i in the Sandoway district. It is a very rare shell.

2. *D. polypleuris*, Bens., occurs abundantly in the Sandoway district and at Nattoung, more rarely near Moulmain.

3. *D. olygopleuris*, Blf. Very fine specimens, measuring 3 m.m. in length and 1·5 m.m. in thickness, were collected on the Kumah hill in Arakan, and a solitary specimen was found at Baom, also in Arakan. The latter exactly agrees in form and size (length 2 m.m.) with typical Cachar specimens, but while in these the costulation generally becomes obsolete on the two last whorls, the same is well developed and comparatively slightly closer

on all the whorls of the Arakanese specimen; the difference is, however not sufficient to indicate a specifically distinct shell from the one above named.

4. *D. exilis*, Blf., was found on the limestone hills at Damotha and at the Farm-caves near Moulmein. Most of the specimens somewhat exceed in size those from Upper Barma; the costulation of the whorls also is a shade finer, though variable in different specimens, and the outer lip of the aperture a little more expanded; however, the general form, character and proportion of the whorls is exactly the same. One of the largest specimens measures: total length 3·2, diameter of penult. whorl 1·, diam. of apert. with perist. 0·9 m.m.; it has nine whorls.

5. *D. nana*, described by Mr. W. T. Blanford from Pegu, also occurs near Moulmein; the specimens only are a trifle smaller than the type shell, but they are very distinctly transversely costulated.

6. Diplommatina angulata, n. sp. Pl. xi. Fig. 3.

D. testa ovoto elongata, dextrorsa, vix rimata, sordide albida, anfractu penultimo latissimo, apice obtusiusculo, pallide rubido, submammillato; anfractibus sex, primis duobus lævigatis, cæteris valde convexis, ad peripheriam plus minusve distincter angulatis, transversim confertissime costellatis aut acute striatis; ultimo basi contracto; sutura profunda, simplice; apertura late circulari, peristomate undique expanso, bilabiato, interno subrecto, ad marginem columellarem dente obliquo instructo, externo ad anfractum penultimum constrictum modice ascendente. Long. 2, *lat. maxima* 0·8, *diam. apert.* 0·6 *m.m.*

Hab. Prope Moulmain, provincia Martaban.

The peculiar angulation of the whorls, combined with the very close transverse costulation, or almost striation, and the proportionately large aperture readily separate this species from any other as yet known. Mr. Theobald obtained numerous specimens on the limestone hill near Damotha, and also south of Moulmain, together with *D. carneola*, Stol.

7. Diplommatina Richthofeni, n. sp. Pl. xi. Fig. 4.

Dipl. testa ovate elongata, turrita, dextrorsa, albida, rimata; spira conoidea; anfractibus septem, convexis, ad medium subangulatis, sutura simplici junctis, penultimo ultimo latiore: primis duobus apicem formantibus lævigatis, cæteris transversim conferte costellatis, ultimo basi convexo, angustato, supra ad anf. penultimum ascendente; apertura parva, circulari, peristomate duplici: interno tubuliforme modice producto atque dilatato; labio ad basin dente obliquo et magno instructo. Long. 2·5, *lat. maxima* 0·8, *diam. aperturæ* 0·5 *m.m.*

Hab. Prope Moulmain; (testa rarissima).

A species closely allied to *D. angulata*, but more slender, with less distinctly angulated whorls, non-mammillated apex, with a slightly more distant costulation and with a comparatively smaller aperture.

Only the solitary figured specimen of this shell was obtained on the limestone hill at the so-called Farm-caves.

Genus, GEORISSA.

1. *Georissa Blanfordiana*, Stol., (J. A. S. B., 1871, vol. xl, pt. ii, p. 158, pl. vi, fig. 6,) described from a single specimen, occurred abundantly both at the Farm-caves and South of Moulmain. The type specimen is rather a young shell, which, when adult, attains a very distinct ovately conoid form, the whorls being in proportion somewhat less convex; the inner lip is strongly thickened. One of the largest specimens measures: total length 2·8, greatest width of the last whorl 2, height of aperture 2·2, its width 1 m.m.

When alive, the shell is rather deep succineous and semi-transparent; old specimens become white. The operculum is of the usual form, very thin, with a long internal process, pale coloured, becoming blackish towards the centre.

2. *G. Rawesiana*, Bens., also known from a single specimen, found at the Farm-caves near Moulmain, occurred in numerous examples on two limestone hills in the Ataran valley. The shell differs from *G. liratula** by a more conoid shape, particularly in the adult, and by a much finer spiral striation, there being on the penultimate whorl as many as seven or eight of these spiral striæ, while in *liratula* there are only five of them. Young specimens of both species are equally globose, and of a succineous structure. One of the largest specimens of *G. Rawesiana* measures: length 2·4, largest diam. 1·8, height of aperture 1, its width 0·8 m.m. In adults the fine sculpture wears off remarkably easily, and such specimens closely resemble *G. Blanfordiana*, but have the whorls more convex, and the aperture proportionately smaller.

3. *G. pyxis*, Bens., a species common about Prome, also occurs on the Kumah hill in the Sandoway district.

4. GEORISSA FRATERNA, n. sp. Pl. xi. Figs. 5 and 6.

G. testa cylindraceo conoidea, solidula, pallida, imperforata, regione umbilicali paulo impressa; anfractibus 3½, *convexis, supra modice subtruncatis, sutura per-profunda junctis, spiraliter crasse liratis, liris in anfractu penultimo quinque, supera a sutura remotiuscula; apice valde mammillato; ultimo anfractu spirâ breviore, basi convexiusculo, spiraliter*

* J. A. S. B. vol. xl, pt. ii, 1871, p. 157, pl. vi, fig. 5.

striato ; apertura fere semicirculari, labro simplici, antice modice recedente, margine subobtuso instructo, labio recto, incrassato ; operculo testaceo, tenui, subdiaphano, paucispirato. Alt. testæ 1·4, *diam. max.* 0·95 *m.m.*

Hab. In valle fluminis Ataran, prope Moulmain.

Allied to *G. pyxis* in having the uppermost spiral ridge on the whorls somewhat remote from the suture, but the ridges themselves are stronger, the whorls somewhat less numerous, the apex very distinctly mammillate; and the entire form of the shell more slender and cylindrical. Only three specimens were discovered by Mr. Theobald.

The slight variation in the shape is indicated by the figures given of two specimens.

ACMELLA HYALINA, n. sp. Pl. xi. Fig. 7.

Ac. testa ovato conica, modice perforata, hyalina, sordide albida ; spira obtusa ; anfractibus $4\frac{1}{2}$ *convexiusculis, sutura simplici et profunda junctis, ad suturam subtruncatis, lævigatis, ultimo spirâ paulo breviore, basi convexo ; apertura regulariter ovata, supra (vel postice) subangulata, haud obliqua, peristomate tenui fere continuo. Long.* 1, *lat.* 0·7 *m.m.* (*Operculum deest*).

Hab. In collis calcareis prope Moulmain.

Of the two known species of the genus, *A. tersa* and the doubtful *milium*, both described by Benson from the Khasi hills, the present new form closely agrees in the shape of the shell with the first, and in the smoothness of the surface with the second.

Acmella, Blanf., is evidently quite distinct from *Georissa*, or *Hydrocena*, the latter being one of the HELICINIDÆ, while the former is most likely a Cyclophorid, or possibly one of the intermediate forms close to *Assiminea* and *Omphalotropis*, connecting the CYCLOPHORIDÆ with the RISSOIDÆ. (Comp. Blanford in Ann. and Mag. N. H. for March 1869).

HELICACEA.

PUPA FILOSA, n. sp. Pl. xi. Fig. 8.

P. testa ovato cylindracea, cornea, pellucida, apice obtusiuscula, rimate umbilicata ; anfractibus $4\frac{1}{2}$ *convexiusculis, sutura simplici junctis, transversim striis cuticularibus, obliquis, filiformibus ornatis ; ultimo spirâ breviore, basi vix angustato, convexiusculo ; apertura subquadrangulari, recta, intus dentibus quinque instructa, labro undique paulo expansiusculo, atque incrassato, infra suturam subangulato, ad latus dentibus duobus parvis profunde sitis instructo ; labio tenuissimo, prope medium dentibus pliciformibus duobus approximatis, anteriore multo minore, prædito ; columella unidentata. Long.* 2, *diam. max.* 1 *m.m.* ; *apert. cum perist.* 0·75 *longa, antice* 0·55, *postice* 0·75 *m.m. lata.*

Hab. In littore Arakanense ; satis frequens.

A well marked species, both by its peculiarly subcylindrial shape and by the denticulations of the apertural margins; it is not uncommon on the Arakan coast.

MACROCHLAMYS [DURGELLA] KUMAHENSIS, n. sp. Pl. xi. Fgs. 9 and 10.

Macr. testa convexiuscule orbiculata, polita, tenui, cornea, anguste perforata, spira modice elevata; anfractibus 4½ convexis, regulariter accrescentibus, sutura simplici adpresssa junctis, infra suturam distincte depressis atque subcanaliculatis, transversim exilissime obsoleteque striolatis; ultimo anfractu ad ambitum regulariter convexo, ad basin convexiusculo, in spatio umbilici rugulose spiraliter striato; apertura ampla, semilunata, paulo obliqua, margine externo simplici, columellari supra reflexiusculo, umbilicum partim tegente. Diam. maj. 9·6, *min.* 8·3. *alt.* 6; *lat. apert. perist. incl.* 5·4, *ejusd. alt.* 4·3 *m.m. Speciminis secundi ejusdem maguitudinis altitudo testæ est* 6·5 *m.m., apertura* 5·2 *lata, et* 4·5 *m.m. alta.*

Hab. 'Kumah hill' in montibus Arakanensibus, regione Sandoway.

Only the two figured specimens of this shell were found by Mr. Theobald at the above named locality. The species is intermediate between Blanford's *compluvialis* and *nebulosa*, differing from the former by being somewhat depressed, by a comparatively slight sutural depression and larger umbilicus; from the latter it differs by its polished surface, less numerous and regularly convex whorls, particularly at the periphery of the last. These differences also apply in a comparison with *M. honesta* of Gould.

Besides the above described new species, *Glessula Peguensis, Gless. hastula,* (somewhat larger than the Sikkim type shell), *Succinea semicerica, Sesara Basseinensis, Helicina Arakanensis, Pupina Blanfordi, Pterocyclus parvus,* several *Alycæi* and *Diplommatinæ* occurred on the Kumah hill and near Mai-i in the Sandoway district of Arakan.

ON THE OSTEOLOGY OF SOME SPECIES OF BATS,—*by* G. E. DOBSON, B. A., M. B., ASSISTANT SURGEON, H. M.'s BRITISH FORCES.

Having lately obtained additional specimens of *Macroglossus spelæus,* from Mr. Theobald,* I have been enabled to have a complete skeleton made from an adult male.

As previously remarked by me, the index finger possesses no trace of a claw, but has instead a small, but distinct third phalanx connected with the

* Collected at the Farm Caves near Moulmain where the specimens, from which the description of the species was taken, were obtained by Dr. Stoliczka. (See Journ. As. Soc. Beng. Vol. xl, p. 261.)

second phalanx by a perfect joint. This phalanx is scarcely $\frac{1}{10}$ inch in length, and is wholly contained within the wing membrane.

If we compare the skull of *M. spelæus* with that of *Pteropus medius*, it will be found to resemble it very closely, differing from it only in size, and in the following points :—

In *Pt. medius*, the sagittal crest is very prominent, forming a sharp ridge continued forwards beyond the middle of the zygomatic arches, dividing at a short distance behind the post-orbital processes of the frontal into two ridges which become continuous with their posterior margins. In *M. spelæus*, the sagittal crest is very short, dividing, at a point corresponding to a line connecting the mastoid processes, into two widely separated very slightly elevated ridges continued forwards to the posterior margins of the post-orbital processes. In *Pt. medius*, the frontal is deeply furrowed between the roots of the post-orbital processes, in *M. spelæus* it is elevated. In *Pt. medius*, the post-orbital processes are very long and curved downwards, separated by a very short interval (in a skull before me 0·15 inch) from a corresponding process sent upwards from the zygoma, thus almost completely circumscribing with bone the margin of the orbit. In *M. spelæus*, the post-orbital processes of the frontals are short, and almost horizontal; the zygoma is slender, and there is no trace of an ascending process.

The bases of the skulls of *Pt. medius* and *M. spelæus* are very similiar, the only difference noticeable being, that, in the former the foramen rotundum and foramen ovale are represented by a single opening, in the latter they are distinct.

In *Pt. medius*, the caudal vertebræ are wanting, in *M. spelæus* they are five in number, very short and rather thick.

The remainder of the skeleton of *M. spelæus* corresponds closely in form, and in the relative proportion of its parts, with that of *Pt. medius*.

I have read with some surprise Prof. Flower's statement* that, in the genus *Pteropus*, " there is no corresponding ascending process from the zygomatic arch,"—for, in a skull of *Pteropus medius*, Tem., (compared, above, with that of *Macroglossus spelæus*) the post-orbital process sent upwards from the zygomatic arch measures 0·15 inch along its anterior margin, 0·15 inch across its base, with a vertical height, posteriorly, of more than 0·10 inch.

The same author, at l. c. p. 153, remarks that Insectivorous Bats have no post-orbital processes of the frontals. This statement is only partially correct, for although many, perhaps most, genera of insectivorous bats do not possess post-orbital processes, yet in some genera they are not only present,

* Introduction to the Osteology of the Mammalia, by W. H. Flower, F. R. S. 1870, page 152.

but also,—in one genus especially,—quite as well developed as in the frugivorous.

In every species of the genus *Taphozous*, Geoff., examined by me, I have found well developed post-orbital processes. In a skull of *T. melanopogon*, Tem., before me, a long and slender post-orbital process of the frontal extends more than half the distance between the frontal bone and the zygomatic arch, forming nearly one-third of the entire circumference of the orbit.

Post-orbital processes of the frontals are also found in the genera *Megaderma* and *Nycteris*. In the latter genus the post-orbital process may be described as a triangular expanded lamina of bone, of which the base extends from the sagittal crest to the maxilla; in the former it is short and blunt, and its base is perforated, as in *Pteropus*, by a supra-orbital foramen.

In *Vesperus pachypus*, Tem., a small post-orbital process exists.

The above examples show that in many species of insectivorous bats post-orbital processes of the frontals are present. In no species, however, have I succeeded in detecting corresponding zygomatic processes, as in the genus *Pteropus*.

Brief descriptions of five new species of Rhinolophine Bats,—*by* G. E. Dobson, B. A., M. B.

The following short descriptions of new species of Rhinolophine bats in the collection of *Chiroptera* in the Indian Museum are intended as prefatory to more detailed descriptions, to be published hereafter with illustrations.

1. Rhinolophus Yunanensis, n. sp.

Ears large; antitragus separated from the outer margin by a deep, angular incision. Nose-leaf large; the horizontal horse-shoe shaped portion concealing the upper lip as in *Rh. luctus*. The upper edge of the central erect, anteriorly flattened, nasal crest meets, at the same level, the upper edge of the posterior vertical membrane. Lower lip divided by a single vertical incision. Wings from the ankles; tail contained within the interfemoral membrane, with the exception of the extreme tip; interfemoral membrane cut square behind, or slightly concave.

Length, head and body, 2·7 inches; tail 0·9; ear (anteriorly) 1·0; nose-leaf 0·7; forearm 2·2; tibia 1·1.

Hab.—Hotha, Yunan; collected by Dr. Anderson during the Yunan expedition.*

* Other new species of bats obtained by Dr. Anderson during the Yunan Expedition have been shortly described by the writer in the Proc. As. Soc. Beng. for Sept. 1871.

2. Rhinolophus Garoensis, n. sp.

Ears acutely pointed with a well developed antitragus. Upper edge of the posterior vertical connecting process of the central nose-leaf forming an acutely pointed elevation; posterior nose-leaf terminating behind in a broad, triangular, pointed process.

Wings from the ankles, interfemoral membrane cut square behind; tip of tail free.

This species is closely allied to *Rh. cornutus*, Tem., from Japan, from which it differs mainly in size.

Length, head and body 1·5 inches; tail 0·7; ear (anteriorly) 0·5; fore-arm, 1·3; 2nd finger 2·0; 4th finger 1·7; tibia 0·6.

Hab.—Garo Hills, Assam. Collected by Major H. H. Godwin-Austen.

3. Rhinolophus Andamanensis, n. sp.

This species resembles *Rh. affinis*, and may be referred to the same section of the genus. The anterior horizontal horse-shoe shaped portion of the nose-leaf is very broad and flat, concealing the muzzle when viewed from above, as in *Rh. Yunanensis*. The posterior triangular nose-leaf is long, and produced backwards between the ears.

Wings from the ankles, or from the tibia slightly higher up. Interfemoral membrane cut square or slightly concave behind; tip of tail projecting.

Length, head and body, 2·5 inches; tail 0·9; ear (anteriorly) 0·85; ear (posteriorly) 0·75; forearm 2·05; thumb 0·45; tibia 1·0.

Hab.—Andaman Islands. Collected by Mr. Homfray, Assistant Superintendent, Port Blair, to whom the Indian Museum is indebted for many specimens illustrative of the zoology of the islands.

4. Rhinolophus Petersii, n. sp.

Ears acutely pointed, with an emargination immediately beneath the tip; antitragus large, separated from the outer margin by a deep angular incision.

Nose-leaf about same size as in *Rh. affinis*. The upper border of the posterior connecting portion of the central nasal crest is produced into a subacute point; the sides of the terminal part of the posterior nose-leaf are deeply emarginate, so that it ends in a small narrow projection.

Wings from the ankles; interfemoral membrane slightly triangular behind; tip of tail free, projecting about $\frac{1}{10}$ inch beyond the membrane.

This species resembles *Rh. acuminatus*, Peters, from Java, but differs from it, as Dr. Peters informs me, in having the terminal portion of the tail free, and in other respects, as in measurement, slightly, and in the form of the ears, &c.

Length (of a male) head and body 2·5 inches, tail 1·0; ear (anteriorly) 0·75; breath of antitragus 0·3; length of forearm 2·0; thumb 0·4; tibia 0·9; foot and claws 0·5.

Hab.—Sent from some part of India, precise locality not known.

5. Phyllorhina Masoni, n. sp.

This species belongs to the same section of the genus as *Ph. Nicobarensis*, Dobson. As in that species, the concave front surface of the base of the transverse nose-leaf is divided into *two cells only* by a single central longitudinal fold; the upper margin or crest of the transverse nose-leaf, and the thickened cordiform ridge behind the nasal orifices develop acute projections in the centre of their front surfaces as in *Ph. diadema*, Geoff. The horse-shoe shaped membrane is simple, with three secondary vertical processes of membrane on each side.

From the under surface of the symphisis of the mandible a small conical bony process projects downwards, about equal to the lower canine tooth in vertical extent.

Wings from the ankles; tip of tail free; interfemoral membrane triangular behind.

Length, head and body, 3·65 inches; tail 1·65; ear (anteriorly) 1·1; forearm 3·35; 2nd finger 5·0; 4th finger 3·9; thumb 0·6; tibia 1·35.

Hab.—Moulmain, Barma.

This fine species was first submitted to me for examination by Mr. Wood-Mason, with the remark that it was most probably new; I have, therefore, much pleasure in connecting his name with it.

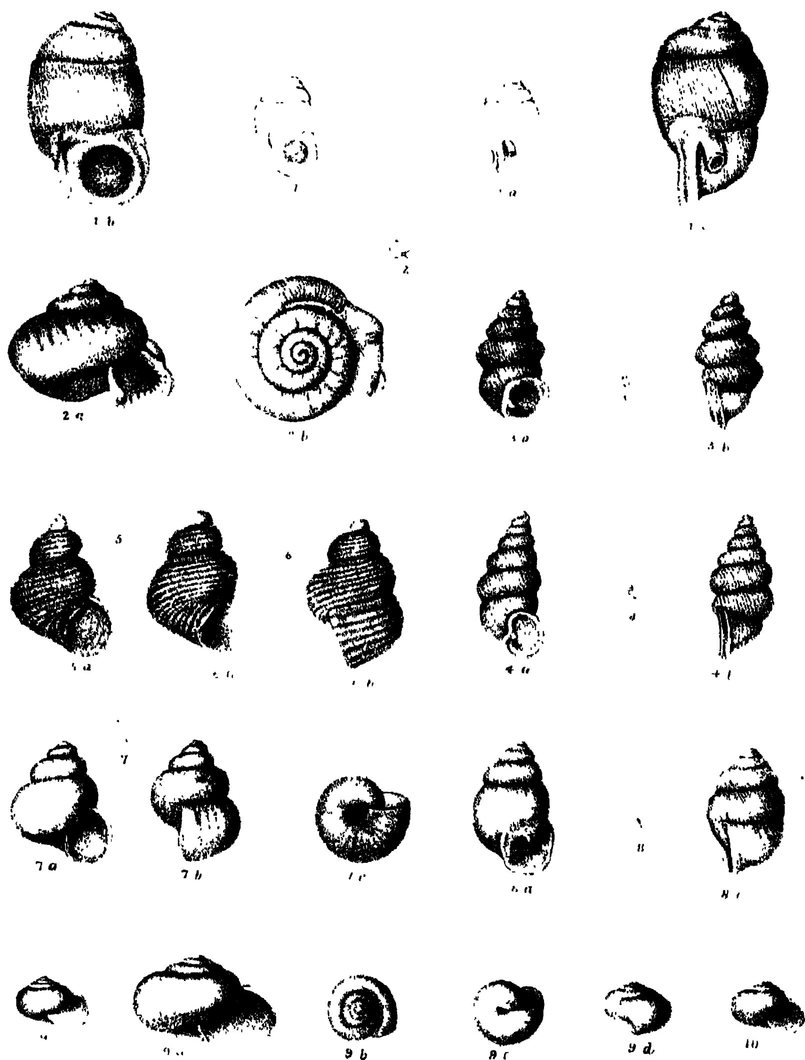
INDEX

☞ Names of new species have an asterisk (*) prefixed.



ERRATA.

Page 55, line 9 from below for *Sesia* read *Tesia*.
„ 219, „ 9 „ above for *ruficaudus* read *ruficaudatus*.



1 *Raphaulus pachysiphon*, p 329
2 *Alycæus Kurzianus*, p 330
3 *Diplommatina angulata*, p 331
4 " *Richthofeni*, p. 331.
5 6 *Georissa fraterna*, p. 332
7 *Acmella hyalina*, p 333
8 *Pupa filosa*, p 333
9-10 *Macrochl. Kumahensis*, p. 333